THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXIII. No. 1623.] LONDON, JUNE 19, 1894. [46TH YEAR. PRICE 6d.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

WOLSTON'S TORBAY PAINTS
Special Quotations to Gas Companies.
DARTMOUTH, DEVON.

Lanemark Coal Co.,
LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on application to
LANEMARK COLLIERY,
NEW CUMNOCK, N.B.
Shipping Ports: All the principal Scotch Ports.

—ESTABLISHED 1830.—
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Manufacturers & Contractors.
THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.
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Ashmore, Benson, Pease, & Co., Ld.,
STOCKTON-ON-TEES,
Manufacturing Gas Engineers.

See Advt. p. 1132 of this week's issue.

BRYNDÛ COAL AND COKE CO., LTD.,
GLYN COLLIERIES, PONTYPOOL.
GLYN CANNEL COAL.
Gas Companies in the neighbourhood of South Wales will find it much to their advantage to use this Coal.
Price and Analysis will be forwarded on application to
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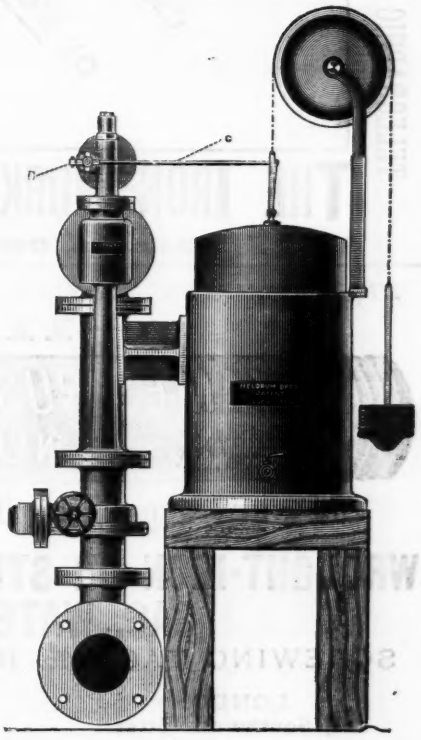
MELDRUM'S Patent
Gas EXHAUSTER & GOVERNOR.
ABSOLUTELY AUTOMATIC.
REQUIRES NO ATTENTION WHATEVER.
Guaranteed perfectly steady Gauge, no matter how Steam Pressure may vary.
— HIGHEST REFERENCES GIVEN. —



MELDRUM BROS., Atlantic Works, City Road,
MANCHESTER.
Telegrams: "MELDRUM, MANCHESTER." National Telephone: No. 1674.

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(Successor to the late BENJ. WHITEHOUSE),

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(ESTABLISHED 1765).

MANUFACTURER OF TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

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MAKERS OF FISH AND SMITH'S PATENT (NO. 5108) OVERFLOWS FOR REGULATING THE SEAL IN GAS-WASHERS, &c.

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Improved Dry-Faced Centre Valves for Working either One, Two, Three, or Four Purifiers at one time; giving an increase of Purifying Area above that obtainable with ordinary Centre Valves of 33⅓ per Cent.

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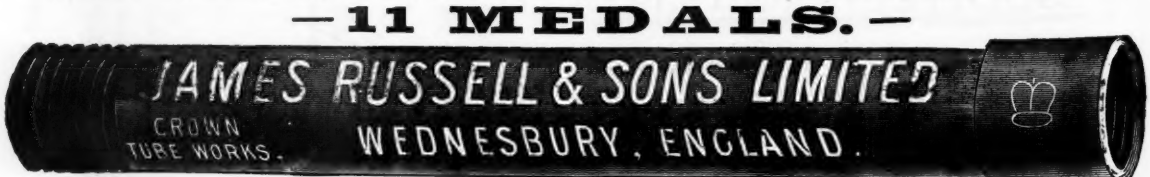

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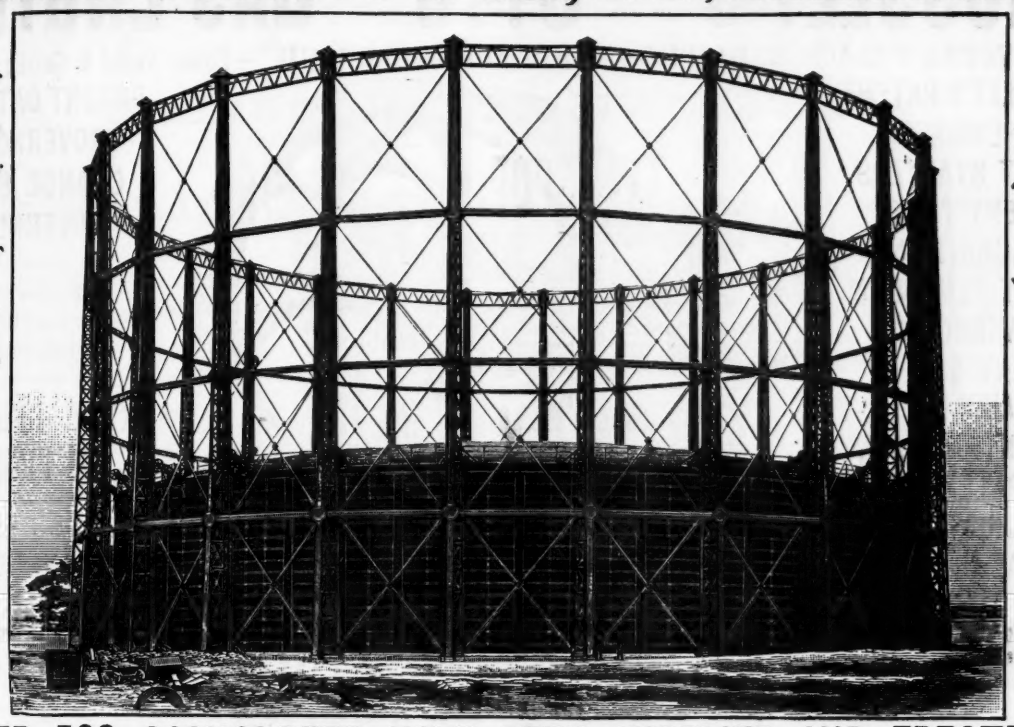

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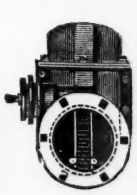

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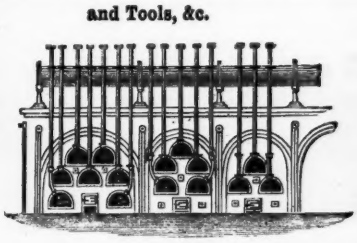

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CONDENSERS, SCRUBBERS, & WASHERS,

TAR AND LIQUOR PUMPS, &c.

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for working Purifiers,

Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,

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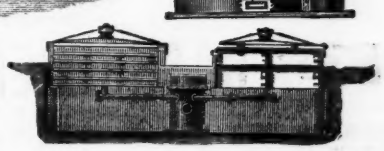

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GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

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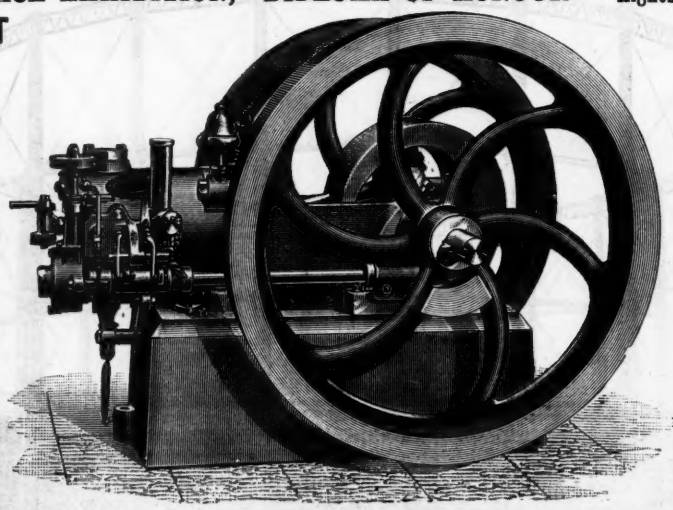

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Every Engine thoroughly tested before being sent out

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GREAT REDUCTION IN PRICES.

OVER 800 ENGINES ALWAYS IN HAND.

CROSSLEY'S NEW HIGH-SPEED ENGINE FOR DIRECT ELECTRIC LIGHTING.

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MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

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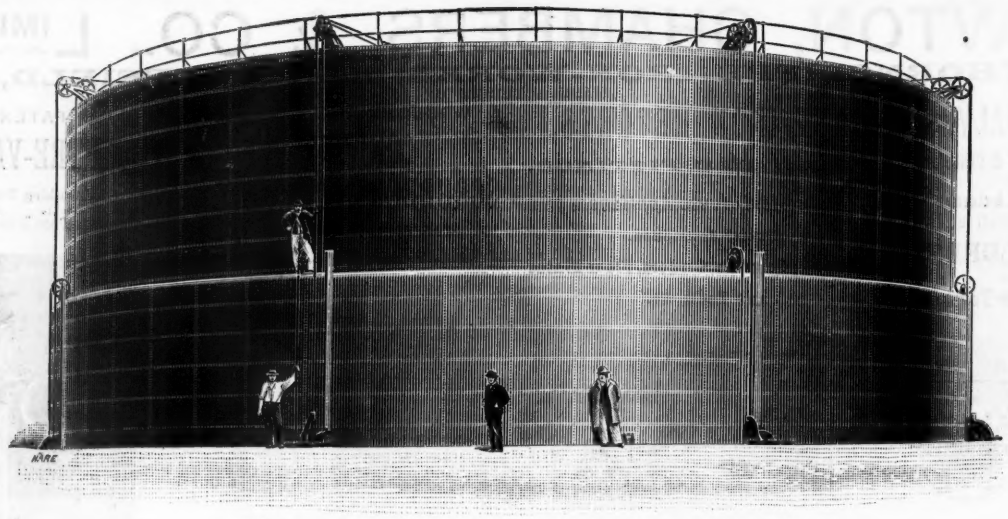

Illustration of BATHURST Holder, 82 feet diameter by 18 feet deep each Lift.

GASHOLDERS ON THE WIRE-ROPE SYSTEM

SUPPLIED TO THE FOLLOWING CORPORATIONS, COMPANIES, AND WORKS AT

MANCHESTER (4 Holders).
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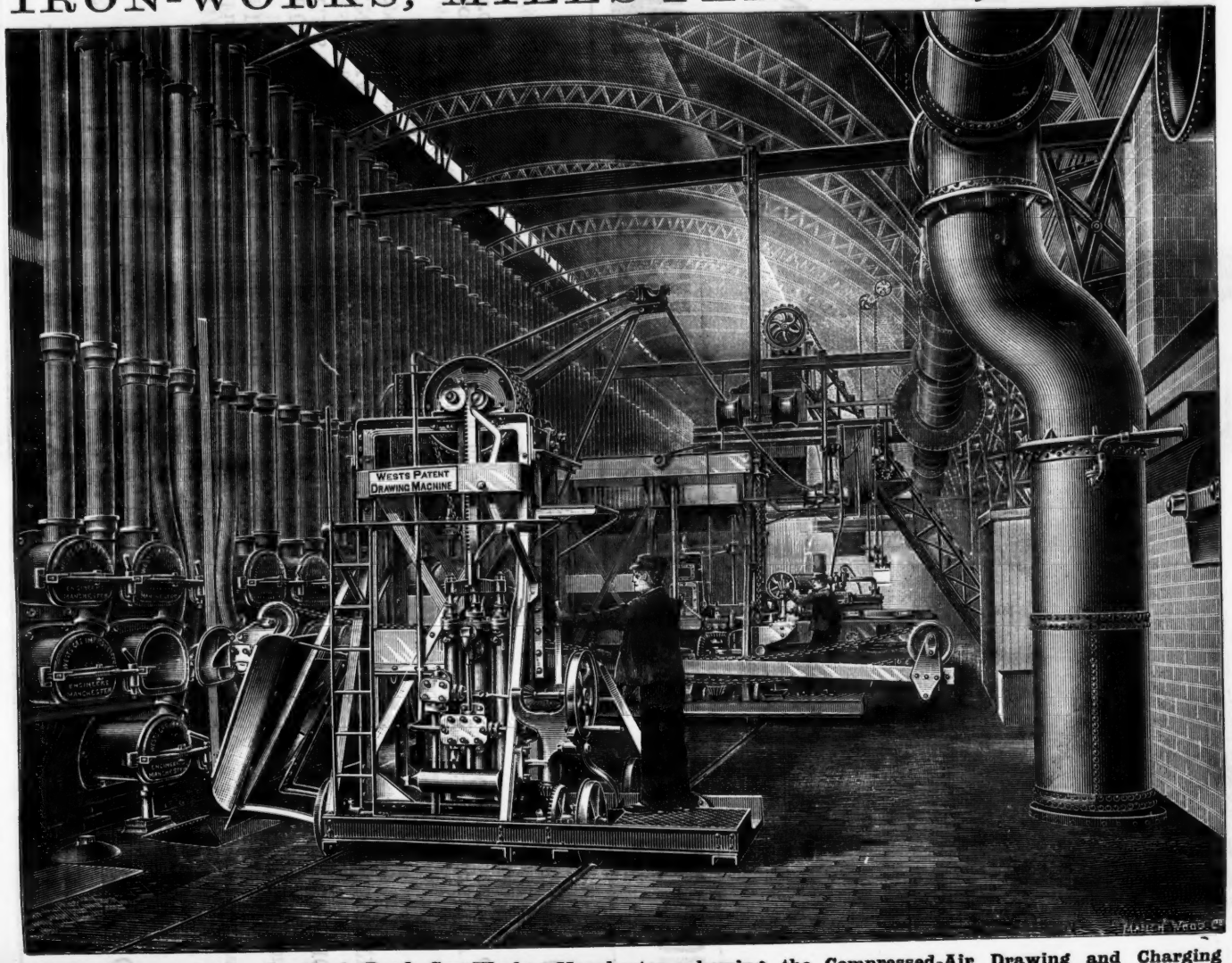
WEST'S GAS IMPROVEMENT COMPANY, LTD.,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER.

WEST'S MANUAL AND POWER MACHINERY FOR CHARGING AND DRAWING GAS-RETORTS.



Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

OVER 560,000 LINEAL FEET OF RETORTS DAILY ARE CHARGED AND DRAWN BY WEST'S MACHINES.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

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TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

LONDON DISTRICT OFFICE: 6, STRAND, LONDON—C. PARKER & SON, SOLE AGENTS.

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WILLEY & Co.,

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MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS.

GASHOLDERS, Telescope and Single Lift, any size. Some of the largest in the Kingdom, erected by this Firm, are giving the highest satisfaction.

PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

PURIFIERS, CONDENSERS, WASHERS, ENGINES and EXHAUSTERS, STATION METERS and GOVERNORS, manufactured and erected.

Makers, by permission of that eminent authority **MR. GEORGE LIVESEY,** of his **CELEBRATED PATENT WASHER,** highly approved by all the Engineers of Works where adopted. Largely in demand.

Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

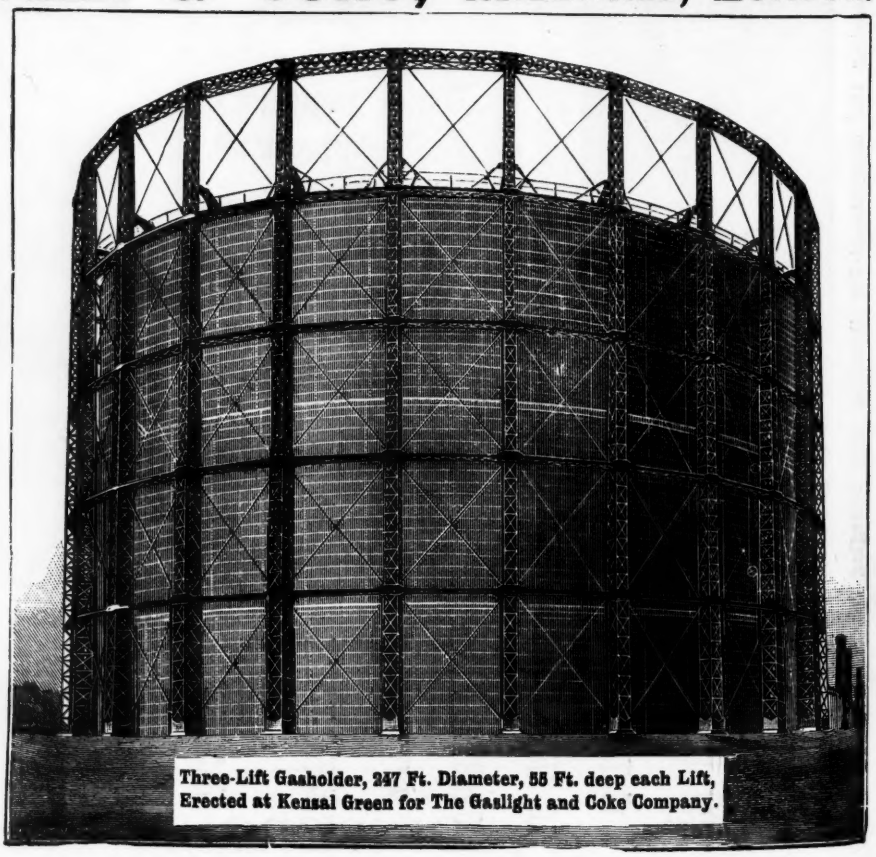
SAML. CUTLER & SONS, MILLWALL, LONDON.

NEARLY

8 MILLION

CUBIC FEET

CAPACITY.



Three-Lift Gasholder, 247 Ft. Diameter, 55 Ft. deep each Lift, Erected at Kensal Green for The Gaslight and Coke Company.

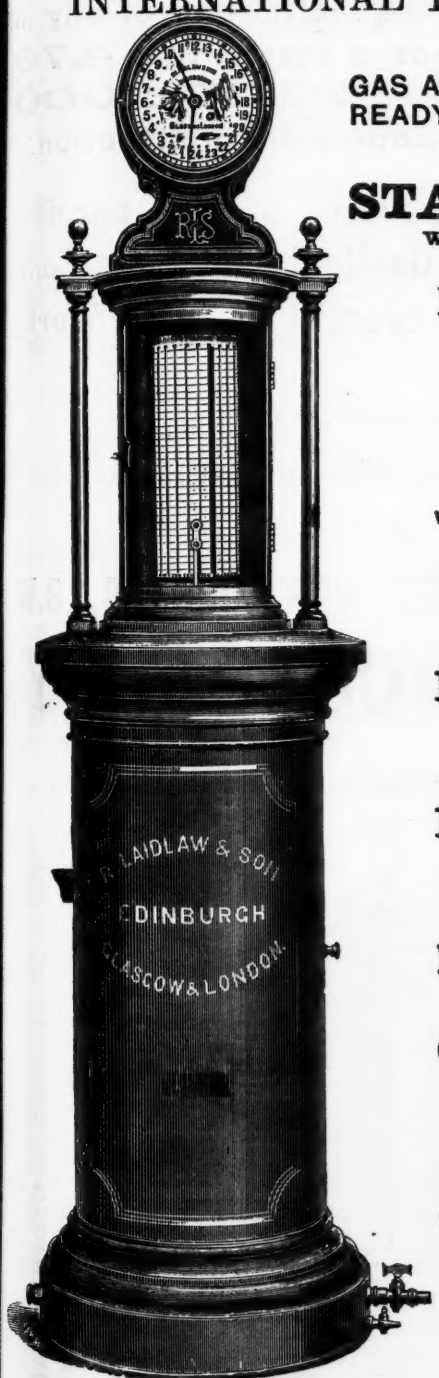
R. LAIDLAW & SON.

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,

INTERNATIONAL EXHIBITION, EDINBURGH. 1886.



PRESSURE REGISTERS.

A LARGE STOCK OF GAS AND WATER METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

STATION METERS,

WITH ROUND OR SQUARE CASES.

Improved Station and Exhauster Governors.

Lamp Pillars,

WITH EITHER WET OR DRY METERS FOR AVERAGE METER SYSTEM.

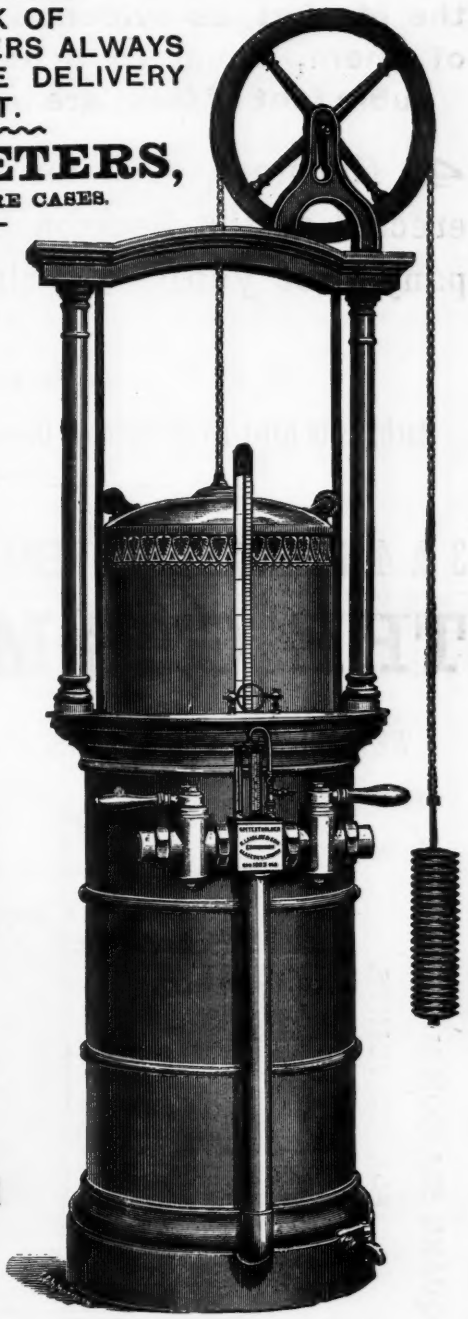
Experimental Hourly-Rate and Test Meters.

Experimental Apparatus.

Pressure Gauges.

Condenser Thermometers.

Siemens' Patent Water Meters, and Gas Apparatus and Fittings.



TEST-HOLDER.

STANDARD TEST-HOLDERS AND TEST-METERS FOR OFFICIAL INSPECTORS, &c.

AUTHORIZED BY THE BOARD OF TRADE. STANDARDS DEPARTMENT.

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KIRKHAM, HULETT, & CHANDLER'S,

PATENT LIMITED,

"STANDARD" WASHER-SCRUBBERS

These Machines are admittedly the most efficient of any in the Market, as evidence of which the fact is stated that 476 of them, equal to a daily capacity of 459,972,000 cubic feet of Gas, are in operation or in course of construction.

4 Machines, each for 3,500,000 cubic feet of Gas per day, erected at the Beckton Station of The Gaslight and Coke Company last year; 2 similar Machines erected at same Works this year.

Machines in hand for Silvertown, Devonport, Dorking, Accrington, Berlin, Marlborough (U.S.A.), &c.

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WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

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J. & H. ROBUS,

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furnish Plans, Estimates, and Specifications for SINKING BOREHOLES *and* WELLS; *Erecting* RESERVOIRS, FILTER-BEDS, *and* GASHOLDER TANKS; *and* EVERY REQUISITE *for* GAS *and* WATER WORKS,

INCLUDING

MAIN LAYING

EXCHANGE TELEPHONE 1756.

FOR **TUBES AND FITTINGS** APPLY TO

JOHN BROTHERTON, LTD., IMPERIAL TUBE WORKS, **WOLVERHAMPTON.**

INCLINED RETORTS,

FIRE BRICKS,
LUMPS, TILES,
BLOCKS, &c.

Special Bricks for Intense Heats.

GAS RETORTS.

CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,

Fire-Brick Works, STOURBRIDGE.

☞ Retort Setters sent to any part of the Kingdom.

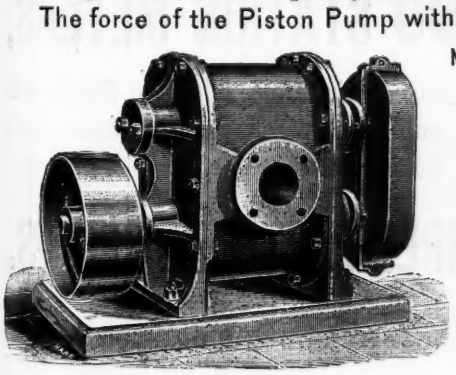
JOHNSON'S PATENT

DRUM PUMP AND GAS EXHAUSTER.

The Pump of the future for quickly and economically moving large bodies of Water, Semi-Fluids, &c.

The force of the Piston Pump with the capacity of the Centrifugal combined

NO SLIDES OR FRICTIONAL WORKING PARTS.



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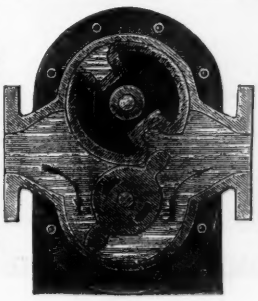

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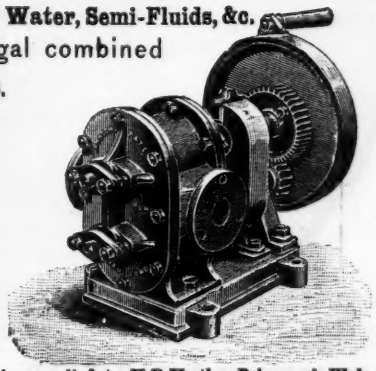


As supplied to H.R.H. the Prince of Wales for Pumping Gas Liquor at his Sandringham Gas-Works.

DRUM ENGINEERING COMPANY,

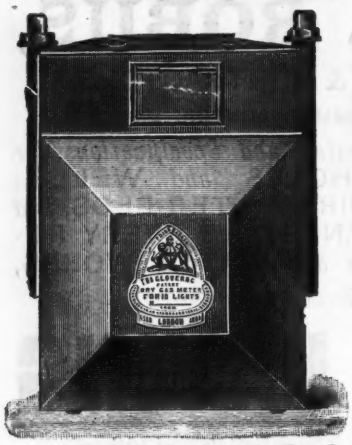
Hydraulic and Pneumatic Engineers, 55, ATHOL ROAD, BRADFORD.

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.

Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

THOMAS GLOVER & CO.,

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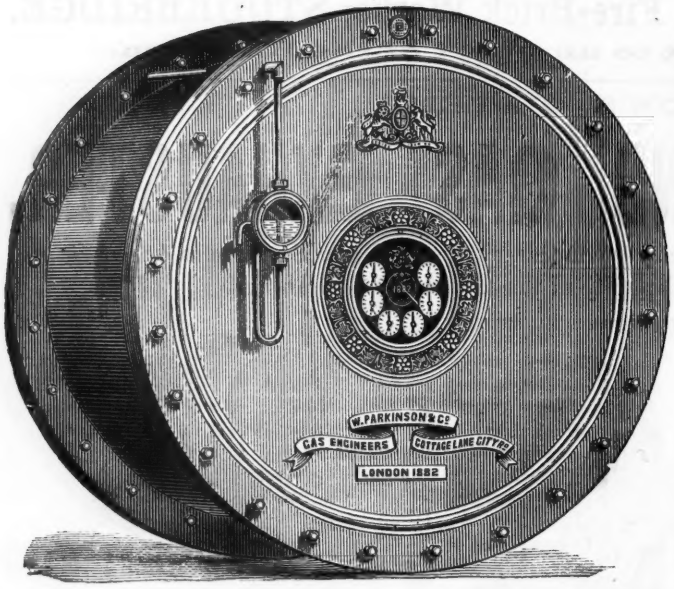

STATION METERS

IN

ROUND or SQUARE TANKS.

500 STATION METERS,

Varying in size from **1200** to **250,000** cubic feet per hour, have been sold, fitted with

THREE-PARTITION DRUMS.

DURABILITY UNEQUALLED. SOME HAVE BEEN IN CONSTANT USE FOR OVER 60 YEARS.

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BELL BARN ROAD WORKS, **BIRMINGHAM.** Telegraphic Address: "GAS-METERS."

10, MAWSON'S CHAMBERS, DEANSGATE, **MANCHESTER.** Telegraphic Address: "PRECISION."

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 19, 1894.

Profit-Sharing in Gas-Works—A Suggestion.

THE letter from Mr. George Livesey in our "Correspondence" columns to-day, in which, as the writer says, he "returns to the charge" in further advocacy of his system of profit-sharing in gas-works, is noteworthy, as carrying the argument beyond the point where it was left by the discussion at the recent meeting of the Incorporated Institution of Gas Engineers. We observed, in our last editorial comments upon the subject, that the author of the only working device of the kind had not suggested a means of applying it to gas undertakings not subject to the sliding-scale principle of regulating prices and, consequently, profits. Mr. Livesey now declares that the system is so applicable; and he asserts that, given a free hand, he could introduce it and give it a fair start in any gas company in England. The pertinacity and ingenuity with which Mr. Livesey addresses himself to the removal or to the avoidance of difficulties in the way of any line of action which he may have marked out for himself, are truly admirable. He is one of the most resourceful, as well as one of the most determined, of men; but in this matter he cannot get away from the sliding-scale. It is, indeed, difficult to conceive how he could work out the problem otherwise; but it is almost as hard to regard as a probability the voluntary adoption of such a datum by those administrators of gas undertakings to whom the principle is foreign. It is true, as Mr. Livesey says, that he has for five years made this question his constant study. But he has been saturated, so to speak, in sliding-scale principles for four times as long a period; and this preoccupation has naturally tinged his whole habit of thought respecting gas-works administration. It may be that even municipal gas undertakings would be better for the introduction into their internal economy of some sort of sliding balance of working cost and profit; but, as matters stand with them, they do not experience the need of any such arrangement, and would regard it as a superfluous entanglement. But is it so absolutely essential to the realization of Mr. Livesey's ideal of uniting the interests of employers and employed in gas undertakings that there should be any such artificial datum laid down—as he admits, arbitrarily? Would it not be equally convenient to agree upon a standard price of coal, a standard gross profit, and connect these with the standard wages? Mr. Livesey cites Birmingham; and the example of this municipal gas undertaking will do as well as any other—perhaps, for the reason Mr. Livesey mentions, it will do better than most—to illustrate the idea. Let us suppose, then, that the standard profit of £25,000 is earned when coal costs 4s. per ton net, and wages and salaries are paid according to the established scale. From this starting-point, it would be very easy to determine for any year whether more or less profit had been made, taking the cost of coal at the same standard figure; and the surplus could be divided in any agreed proportions among those entitled to it. In this way the objection that the profits of gas making are usually governed by causes outside the power of the workers to influence one way or another would disappear; and it would be seen whether personal interest does affect the result, and how much. We offer the suggestion merely as a contribution to the controversy upon the general subject, and trust that others will be formulated by gas managers interested in the high cause so manfully contended for by Mr. Livesey. He will bear us witness that, by paying very much more attention in our editorial columns to questions of social and industrial economy than was formerly thought to be a necessary part of the mission of a technical periodical, we have done, and are doing, all that lies in our power to help gas-works administrators to realize their duty to the community in regard to that great problem which lies so near to his heart. It is difficult, doubtless, to lift out of the ruts of old habits of thought people in the respectable condition of gas directors and committeemen. But the world moves without asking leave of them; and if they will not go with it, they and theirs will by-and-bye be stranded high and dry, like the abandoned Cinque Ports, while the great channel of life, prosperity, and beneficent employment bears the affairs of the world past the place of their desolation and vain regretting.

The Case against Prepayment Meters.

THE letter of Mr. J. S. Cranmer which will be found in our "Correspondence" columns to-day may be expected to attract the attention of all gas managers interested in the working of the prepayment meter system. It is Mr. Cranmer's deliberate opinion that, unless a minimum consumption of 10,000 cubic feet of gas per annum can be obtained from every meter, the system will not pay. In his own case, he calculates that if the Corporation Gas Department of the borough of Stratford-upon-Avon were to find themselves in possession of a connection of this character including 100 meters, they would make a loss of £7 3s. 9d. a year upon the whole business. This dreadful prospect has so frightened Mr. Cranmer's Committee, that they are afraid of extending to their poorer fellow townsmen the benefits of gas supply. All we can say is that we are sorry for them. Mr. Cranmer is personally justified in all he has done to place his Committee in possession of all the facts that might be considered as necessary to the solution of the question; but evidently the Stratford

magnates are no sportsmen. We have never regarded as very profitable customers the class of consumers which in most communities awaits the prepayment meter before contributing to the revenues of the gas undertaking. In some instances they really are profitable—taking more gas per head than others of the same social order who have meters of the customary kind. We are aware of instances of consumers who deliberately prefer the prepayment meter, for the reason that they like to pay cash for what gas they require. It may be quite true, as Mr. Cranmer states, that, if regarded from the commercial point of view, prepayment meters and fittings are not worth supplying when the prospective demand for gas is only likely to reach 6000 cubic feet per annum per meter; but does every consumer on the ordinary list return a profit? What about the public lamps? Gas supply, even by a municipality, is not a philanthropic enterprise; and the commercial aspect of it must never be lost sight of. But there are two ways of regarding the latter. The old-fashioned shopkeeper would hardly trouble himself to serve a penny customer; while the new order of retailer will send a pair-horse van to deliver a pennyworth of tape. The Stratford-upon-Avon Gas Committee should interview Mr. William Whiteley when next they come to town. They are not alone in their attitude to prepayment meters; for The Gaslight and Coke Company are no believers in this agency for extending gas consumption. Well, there is room enough in the world for a good many opinions; and the makers of prepayment meters have as much as they can manage to do in meeting the demand for reliable goods of the kind. It is better not to force the vogue upon gas manufacturers who are not disposed to take to it kindly; but when one reflects upon the increased share of comfort that gas is capable of importing into the poor man's cottage, it is a great temptation to give him and his wife, the "benefit of "the doubt" in regard to the strict commercial advantage of the supply.

Freaks of Municipal Politics.

The association of party politics with municipal questions, defended for particular reasons by many, nevertheless sometimes produces quaint consequences. We recently came across a newspaper report concerning the adoption by the Executive Committee of the Bradford Liberal Association of a set of suggestions for a Liberal municipal programme, which was in due course submitted to a meeting of the Liberal Six Hundred, and more or less approved of. This profession of the orthodox Liberal faith in regard to what is needed to make Bradford happy is a very modest and practical compilation. They have no ardent Socialists in the Bradford Six Hundred, or we should have been treated with urgent demands for the instant abolition of poverty by the Corporation, and for various other boons for which civilization has been "groaning and travailing until now." Instead of so much "forwardness," we find a variety of recommendations for the provision of more open spaces, for the establishment of industrial schools, and for other reforms of which one can fully appreciate the desirability without being one of the noble Six Hundred. Among these occurs one particular clause that "gives us to think," as the French have it. It is the formal statement "that gas and electricity profits should not be utilized "in relief of rates, but the gas and electricity should "be sold at cost price, with a due allowance for "sinking and reserve funds." Why, this is the doctrine we have maintained and expounded in these columns for years, to find at this hour that it has become a "plank" in the "platform" of Bradford Liberal Municipalism. Yet the desolating question rises, Why? What is the *nexus* between the Liberal Six Hundred of Bradford and the position of the Journal in regard to municipal gas supply? We try to keep out of politics, especially municipal politics, which are usually too involved to be intelligible beyond the municipal boundary; and now it appears that we have been preaching Bradford Liberal municipal politics for years without knowing it. We can do nothing to help ourselves out of this false position, and can only hope that, if we have any Conservative readers in Bradford, they will accept our assurance that we have meant no harm, and that, so far as acceptance of this particular dogma goes, it will really not hurt men of any political party to fall in with it. The most curious feature of this development of municipal politics is that what is Liberalism in the Yorkshire borough is the other thing elsewhere. It has been said of a yet larger Corporation than that of Bradford, that if the Gas Committee were to cease subsidizing the rates, the Liberal majority upon the Council would be swept away, and the Conservatives would come in with a rush. These are high questions; but we do hope, once for all, that, whether cheap gas happens to be a Liberal or a Conservative weakness in any particular locality, our readers will not suspect us of electioneering motives in occasionally advocating it.

A Dinner from the Wire.

An interesting dinner was given at the Cannon Street Hotel on Friday last, to a party of about a hundred gentlemen; its peculiarity being the method of cooking, which was wholly electrical. The City of London Electric Lighting Company were the donors of the feast, which was presided over by Sir David Salomons; and among the guests were numbered several prominent sanitarians, including Mr. Ernest Hart, once of smoke-abatement fame. We are assured by a newspaper reporter who was present that the dinner exhibited the perfection of cooking; and it is not difficult to believe that the viands did not taste of electricity. The Chairman, in giving the toast of "Success "to the Development of Electricity," observed that those present had the satisfaction of knowing that the food they had eaten had not been adulterated by carbonic acid, carbonic oxide, or sulphuretted hydrogen. They would have noticed that there was no taste of gas, coal, or smoke about it. At the price which the Company intended to charge for electricity used for the purpose—4d. per unit—the dinner cost two-tenths of a penny per head for cooking, which the Chairman thought would be regarded as "not "unsatisfactory." Professor Silvanus Thompson is reported as having remarked that food that has been cooked by electricity contained neither sulphurous nor tartaric elements; and Mr. Ernest Hart enthusiastically hailed the prospect of the introduction of electrical cooking apparatus into the poor man's house as tending to cleanse the atmosphere of London. A good deal more chatter of the same sort was probably talked on the occasion; but the reporters mercifully omitted to record it. It is wonderful how solemnly absurd men of science like Professor Silvanus Thompson can be when they choose. We do not remember to have heard that the City of London ever experienced any difficulty from the carbonic acid and other products of fire and gas used in cooking before the advent of the Electric Lighting Company. From all accounts, it has generally been understood that City cooks have managed to do their work pretty well hitherto; but one lives and learns. The hygienic difference between turtle soup warmed in an electrically-heated stewpan, and the same heated over a gas-ring, must, of course, be very conspicuous; and one can only lament that so long a line of Lord Mayors and Aldermen have gone their ways without testing it. One may be permitted to observe, however, that the Cannon Street Hotel can hardly be described as a poor man's house, *teste* Mr. Ernest Hart. Nevertheless, it is not, we believe, a "gold mine" for its proprietors or lessees; and we doubt whether the management will be able to afford the luxury of electrical cooking without assistance from the Electric Lighting Company. It sounds a small thing to say that a meal has been cooked for 120 persons for a consumption of 60 Board of Trade units, working out to a cost of two-tenths of a penny per head; but this is not the whole of the story. Sixty units at 4d. amount to £1; and in all probability the same work could have been done by coal or gas for one-third of the money. Even then, the mere cost of cooking the dinner is not the last of it. There are the washing-up and many other little things to be done; and we know full well what these mean in the case of gas, to say nothing of electricity. We should like to talk to the Manager of the Cannon Street Hotel and Sir David Salomons upon the subject twelve months hence.

The Responsibility for Useless Strikes.

There is a good deal of puzzling news in circulation concerning the intention of coal miners in Scotland and in Somersetshire—the extremes of the British coal-fields—to strike against reductions of wages stated to be rendered necessary by the depressed condition of trade. There is always a certain amount of talk in the newspapers about coal miners and their doings; and it is difficult to ascertain

from so much verbiage what is actually "in the wind" at any particular time. It is the fact, however, that the Scottish Miners' Federation have taken a vote of the men upon the question whether they should "come out" in accordance with the recommendation of the National Federation recently held at Carlisle. The incident is worthy of notice as an illustration of the way in which these Trades Unions boldly usurp the right of speaking in the name of all the workpeople connected with their particular industry, whether they are actually members of the organization or not. It has transpired that the Scottish Miners' Federation represents a rather smaller minority of the workers in the Scotch coal-fields than is usual even in the case of the newest of new Unions. The problem of how to take a vote upon the wages question without exposing to the world the numerical weakness of their organization, must have greatly exercised the professional agitators in command of the Federation; but they got out of the difficulty very cleverly by sending balloting-papers to all the miners in Scotland, irrespective of their being members of the Union. So, at least, runs the newspaper report; although no explanation is offered of how the Federation contrived to get at the non-Union miners. It is stated that 70,000 papers were issued, which may or may not account for all the men interested in the question at issue. It was obviously a cunning move on the part of the Union leaders to make this pretence of polling all miners', whether society men or not, for two reasons. In the first place, they thereby avoided the inconvenience of exposing their own weakness, while obtaining credit for magnanimity in placing the question at issue on the widest possible basis. The result, however, is a sad exposure of the trick. Of the 70,000 voting-papers issued, 40,107 were returned: and the result of the ballot was announced as follows: For a strike, 25,617; for continuing work, 14,490—majority in favour of striking, 11,127. Whereupon the Federation delegates, who took the decision into their own hands, determined that work should cease on the 25th inst. There could not be a better illustration of the rule of the minority in Trade Unionism. According to their own showing, the Scottish Miners' Federation have presumed to order a strike at the desire of 25,617 out of 70,000 men; and they are foolish enough to believe that with such a force they are likely to succeed in it. No wonder commercial opinion in Glasgow regards the decision to strike as unwise.

The Miners' Federation of Great Britain have been interfering with the Somerset men, whom they ordered to come out rather than submit to a reduction of 10 per cent. in their wages, which some of them had already agreed to, with a view to enable the colliery owners to meet the market. It was always doubtful whether the men would obey the order, especially as it was not at all certain that the Federation would support them if they ceased working in obedience to the orders of the Executive. The men have decided to take their own course, and accept the reduction. The Federation appeared to be trying the old game of exhorting the men to stand out for their "principles," at their own expense; but it is hardly likely that the delusion will succeed again in this part of the country. The history of these Federation interferences in local disputes supplies a strong commentary on the reported advice of the Duke of Devonshire that Trades Unions should be permitted to acquire the status of corporations having collective responsibility. Writing upon this suggestion, the *Daily Chronicle* has pronounced strongly against the idea, on the implied authority of the Trade Union members of the House of Commons; stating that if such a "monstrous proposal" as that of uniting collective responsibility with collective power were ever carried out, "it would simply mean the break-up of "every Trade Union in the United Kingdom which found "itself compelled to engineer a strike." The Miners' Federation are showing why. They send a paid spokesman into Somersetshire to excite the local miners to strike; and this man is at perfect liberty to talk at large about the splendid way in which they will be backed up by the Federation if they follow his advice. But at present the orator cannot bind the organization, as would be possible under the Duke of Devonshire's reported scheme. Naturally, therefore, the official Trades Unionists of the House of Commons prefer to remain in their actual position of being able, with the consent of the foolish, to "call the tune," while leaving the latter to "pay the piper."

WATER AND SANITARY AFFAIRS.

The shareholders in the Southwark and Vauxhall Water Company, at their half-yearly meeting last week, were congratulated by Mr. C. M. Vialls (who presided in the unavoidable absence of Sir H. E. Knight), on the success of their own Bill in Parliament, and were advised that, to a certain extent, the Company had reason to be satisfied with the treatment they had received under the Bill of the Thames Conservators. It was bad enough to have to pay in future £4550 instead of £3300 per annum; but it was apparent that, if the Select Committee had not reduced the terms of the Conservancy Bill, the yearly contribution would have been raised to £5500. The addition of £2200 would have involved a decidedly heavier burden than £1250, though the lesser sum may not be considered small. Another matter for satisfaction was the absence of any interference with the present rights of the Companies in the abstraction of water from the Thames. We are not quite so sure that this is absolutely the case; but we trust it will prove so. Our doubt has reference to the underground water on the river side. Among the burdens falling on the Water Companies are those of the ordinary rates and taxes, which have increased of late years to an extraordinary amount. How this money is to be found, should the water-works become public property, is a question which seems to trouble nobody. Following the meeting of the Southwark Company came that of the Grand Junction, held on Wednesday last, with Mr. Francis Tagart in the chair. An important announcement was made to the effect that the scheme of Messrs. Hunter and Fraser had not been set aside. According to Mr. Tagart's view of the situation, there is a fair prospect that, in the next session of Parliament, a Bill will be promoted by certain of the Water Companies for carrying out a combined project on the basis of the recommendations made by the Royal Commission. On the other hand, there are very clear tokens that the County Council are laying their plans for going before Parliament next year with a Bill altogether different from anything that met with the approval of the Commission presided over by Lord Balfour of Burleigh. Next year we may expect war on the Metropolitan Water Question.

Mr. Tagart drew the attention of the Grand Junction shareholders to the circumstance that the Select Committee on the Thames Conservancy Bill, in settling the constitution of the new Board, had provided that the Water Companies should have one representative. This we anticipated in our remarks last week. We likewise reckoned on the chagrin of the County Council, who rather coolly told the Committee, through the medium of their Counsel, that, as their representatives were to be so limited, "they felt the interests of London could not be "properly represented;" and they "desired respectfully "to withdraw" from the inquiry. They withdrew accordingly; and they find themselves equally represented with the Corporation, who, so far as the Thames is concerned, have a much more extensive interest than the County Council. If the Council could have been allotted seven representatives in place of four, they would have been gratified with a sense of pre-eminence, and by-and-bye perhaps would have had their own Chairman. It should be observed that on the existing Board the Corporation have seven members and the County Council three. According to a recommendation to be laid before the Council to-day, the further progress of the Bill is to be opposed to the uttermost. The Bills of the Water Companies are also to be opposed by the Council in the House of Lords.

Another matter referred to at the Grand Junction meeting was the great attention which the Directors are paying to the subject of filtration, and the increased thickness of sand through which the water has to pass. This is a topic to which reference is made at some length in the annual report of Dr. Frankland, just issued by the Registrar-General. The progress of cholera up a river, instead of down the stream, is explained as being due to the habits of men on board boats and barges. Hence, according to Dr. Frankland's view, the zymotic poison is carried up the stream as far as the river is navigable, and, it may be, still farther by means of canals. The danger would appear formidable; but Dr. Frankland goes on to show that "efficient sand filtration is practically a perfect "safeguard against the introduction of the cholera

"bacillus into drinking water;" and it is believed that the same is true of the typhoid bacillus. It is well known that the Grand Junction Company have the merit of employing a double system of filtration in the treatment of water taken from the river in time of flood. On the whole, Dr. Frankland's report shows how admirably the water supply of London is guarded against the advance of cholera. It is only insisted, and that with due emphasis, that the filtration shall in all cases be truly "efficient." On this principle the Companies are working; and the subject is becoming more thoroughly appreciated every year. In this question the Companies have practically led the way, though the bacteriologists have of late come to their aid and given them a very great deal of encouragement.

In the parliamentary contest in which the Ambleside District Gas and Water Company have been engaged with the Local Board of the district, questions arose which suggest some food for reflection. Apart from the heat of forensic argument, and from the influence of local passion and prejudice, these questions—which have reference more particularly to the arrangements for water supply—are well deserving of attention. The Ambleside case is a typical one, in which private enterprise is seeking to meet public requirements under circumstances of considerable difficulty, while the spirit of Municipalism stands watchfully in the background, with all its modern instinct of annexation fully developed, and ready to pounce upon the undertaking at the very moment when a pounce seems promising. Here we have a Company that, being merely registered under the Companies' Act, 1862, and having no special statutory authority, find it extremely difficult to carry on their business under satisfactory conditions. They have no means of inspecting fittings, if consumers do not want them inspected; and for this and cognate reasons the Directors seek parliamentary powers, and lay their case before a Committee of the House of Commons. Meanwhile, the Local Board have been in communication with the Company, with the view of acquiring the undertaking; and here comes in one of the elements of controversy which excited no small degree of warmth on the part of the learned Counsel whose services had been retained by the contending parties. It seems that the Company wrote to the Clerk of the Local Board, in regard to the pending negotiations, under cover of the familiar phrase "without prejudice." Yet the correspondence thus dubbed found its way into the petition presented by the Local Board. This was characterized by Mr. Bidder, Q.C., as one of the most scandalous and flagrant breaches of faith that had come within his parliamentary experience, which, needless to say, has been very extensive. This imputation Mr. Balfour Browne most vigorously repudiated; and, however unfortunate the result, no one can suppose that there was any intentional disregard of an honourable understanding. The fact that the petition incorporating the "without prejudice" correspondence was prepared by Mr. Pritt (of Messrs. Sherwood and Co.), a Parliamentary Agent of great experience and high character, makes such a supposition out of the question. No doubt it was necessary that the contents of the Company's letter should be communicated by the Clerk to the members of his Board; and what took place at the Board, being considered public property, found its way into the newspapers, and thence apparently was transferred to the parliamentary proceedings. The result, however, is to be deplored. Negotiations intended to be "without prejudice" should certainly be strictly so regarded; and the fault seems to lie with the Local Board, whose care it should have been to discuss the correspondence in Committee, or in such a way, at all events, as to avoid any possible ground for the suggestion that there had been a breach of faith. In future, Companies who are involved in "without prejudice" negotiations with public bodies whose proceedings are reported in the Press, will have to take special care to protect themselves from the sort of thing which has so recently happened in the Ambleside case.

One other point in connection with these proceedings seems to call for notice. The Referee (Mr. Bonham-Carter), alluding to the reasons for the promotion of the Bill, inquired whether it had never occurred to the Company, since there was no power to examine fittings, to cut off the water supply where waste was discovered. The witness for the Company answered "No;" thereby suggesting that the Directors had not considered their ordinary powers as a trading company, who, of course, need not supply what their customers refuse to pay for. But it can scarcely have been intended that the answer should be taken literally. The Directors must, of course, have been aware of the primary power in question. But, after all, that affords no reasonable or convenient equivalent for the right of inspection, and the usual statutory facilities for the prevention of waste. It is not the object of a water company, whether endowed or not endowed with parliamentary powers, to deprive their customers of a supply, but rather to furnish the supply without at the same time suffering useless loss of water. Companies possessing power to cut off and power to inspect do not, except in extreme cases, deprive even the most impecunious or dilatory consumer of a supply of water, which, on sanitary grounds, is necessary for both the just and the unjust. The spirit of the times is against such drastic methods; and if in the Ambleside case the non-exercise of the cutting-off right influenced the Committee to throw out the Company's Bill, such a line of reasoning appears to us inconclusive and unfortunate.

The City Surveyorship of Manchester.—Mr. T. de Courcy Meade, Engineer and Surveyor to the Hornsey Local Board, has been appointed City Surveyor of Manchester.

Mr. Wilfred Wyld has been appointed Manager of the Bradford Corporation Chemical Works, which position, as announced last week, was lately vacated by his father (Mr. John Wyld).

Mr. C. H. Armstrong, who was for some time cashier to the Walker and Wallsend Gas Company, has received the appointment of Secretary, in succession to the late Mr. Frank Carr; and he will now discharge the duties of both offices.

Mr. A. R. Binnie, M.Inst.C.E., the Chief Engineer to the London County Council, has been appointed County Surveyor to that body. Mr. Binnie has been discharging the duties of the office; but he was not formally installed in the position till last Tuesday.

Reduction in Price by the Crystal Palace District Gas Company.—In connection with the letter of Mr. George Livesey on the "Profit-Sharing System," and the rules which have been framed in connection with the introduction of this system at the works of the Crystal Palace District Gas Company, which appear elsewhere, we may mention that the Directors of the Company have decided on reducing the price of gas to 2s. 8d. per 1000 cubic feet from the date of the Midsummer quarter's accounts.

Death of Mr. J. Brooks.—We regret to announce that Mr. Joseph Brooks, the Chairman of the Gas Committee of the Manchester Corporation, died last Sunday at Blackpool, where he had been residing for some time in the hope of improving his health. Mr. Brooks had been a member of the Manchester City Council for twelve years; and four years ago, on the death of Alderman Lamb, he became Chairman of the Gas Committee—a position to the arduous and important duties of which he devoted much attention. He was held in high esteem both in and out of the Council.

The Incorporated Association of Municipal and County Engineers.—The annual meeting of this Association will be held at the Institution of Civil Engineers from the 21st to the 23rd inst., under the presidency of Mr. A. M. Fowler. Among the papers to be read on the occasion is one by Mr. J. N. Shoolbred, on "The Results of Four Years' Working of the Bradford Corporation Electricity Supply;" and Mr. R. Hammond will deal with the subject of "Electric Street Trams." On the last day of the meeting, a visit will be paid to Teddington, for the purpose of inspecting the Molesey sewage works.

The Rating and Gas and Water Charges in Provincial Towns.—The Borough Treasurer of Preston (Mr. J. Carter) has compiled an interesting table, showing in detail the rates levied for the year 1893-4 in many of the large towns of England and Wales. We find therefrom that the ratepayers of Wolverhampton pay the highest amount out of the places selected for comparison; the figure being 7s. 7d. in the pound on a rateable value of £279,116. Sheffield follows, with 7s. 6½d. on £1,145,361; Leicester and South Shields come next, with 7s. 6d. on £655,782 and £283,278 respectively; while Preston pays 7s. on £356,767. The lowest-rated town in the list is Southport, with 3s. 10d. in the pound on £269,216, and no School Board rate. Out of the fifty towns selected, in only twelve is the net price charged for gas 3s. or upwards per 1000 cubic feet. At Gateshead it is 1s. 7·8d.; at Plymouth, 1s. 9d.; at Sunderland, 1s. 11d.; and at Darlington, Halifax, and Middlesbrough, 2s. The lowest charge for water for domestic purposes is in Liverpool—7½d. in the pound, on houses of £15 rateable value. Salford and St. Helens come next, with 8$\frac{1}{10}$d. and 10½d.; and Brighton next, with 9d. Accrington, Ashton-under-Lyne, and Rochdale are highest, with 1s. 11d. in the first-named towns, and 2s. in the last.

THE INCORPORATED GAS INSTITUTE.

PROCEEDINGS AT THE THIRTY-FIRST ANNUAL GENERAL MEETING,

HELD AT THE

WESTMINSTER TOWN HALL, JUNE 19TH, 20TH, & 21ST, 1894.

JOHN WEST, ESQ., M.Inst.C.E., President.

INAUGURAL ADDRESS.

Gentlemen,—Before proceeding with the business of our meeting, my first and pleasing duty is to heartily thank you for the honour and distinction you have conferred upon me in electing me as your President. In occupying the chair this morning, I feel that I can rely upon the sympathy, the generous help, and the support of the members. We have a long programme, and many papers before us, the whole of which we hope we shall be able to find time for reading and discussing; therefore it is very necessary that no time should be lost, so that we may gather as much valuable information as possible from each other during this session, and within the limited time at our disposal.

The report of the Council, I believe, will be accepted as a highly satisfactory one, as it will be seen from the accounts that our receipts during the past year are fully equal to our expenditure; and it is gratifying to find that we again have this year a very large accession of new members. Although you may have seen, in the report already sent to you, the names of all members whom Death has removed from us, I feel that we cannot allow this opportunity to pass without recording publicly the deep regret we all feel at the loss of two of the oldest members and founders of the Institute—then the British Association of Gas Managers. I refer to the late Mr. Thomas Hawksley, the very eminent gas and water engineer, who was our first President, and remained in this position for three successive sessions, and was also for many years one of our Trustees, during which period it is well known that he rendered invaluable services to the Association. Mr. John Hutchinson was also a member for 30 years, and always felt a deep interest in the Institute, and did much to enhance its welfare. Those among us who were personally acquainted with these very highly respected veterans of the gas profession cannot, I am sure, help feeling that by their removal we have lost old friends, and men whose personality cannot well be replaced.

In connection with the annual report, I would point out that for a long time the Council have had under consideration the desirability of appointing some competent person to watch, on behalf of the Institute, all the Bills and other matters brought before Parliament, and any other questions of a general character that affect the gas industry. A scheme for collecting information of this character is now being formulated; and it is the intention of the Council to send to all the gas companies and corporations who subscribe to our funds, the Board of Trade returns, together with information on all matters which have an intimate bearing upon our industry.

It is the custom of many of the important institutions to issue certificates of membership to those who join them. This question has been before the Council for a long period; and a certificate has finally been prepared, which we hope will meet with the general approval of the members.

After the many excellent addresses that have been delivered upon almost every topic in connection with our industry, it is extremely difficult to find suitable subjects upon which to address you, and occupy profitably your valuable time. Our Past-President, Mr. Denny Lane, gave us last year a very valuable address upon a special subject; and, as you all know, his address was very highly appreciated. Mr. Alfred Colson, the President of the Institution of Gas Engineers, followed, this year, on similar lines, by giving prominence to the results of his own practical experience more especially with one department of the gas undertaking under his charge. Undoubtedly such addresses upon special subjects are of the highest value when dealt with in a masterly way, like the two addresses referred to; and for some time it has been my endeavour to select a special subject. As, however, this could not be accomplished without bringing in too much of my own personality, I have decided to deal, in the first place, with several questions which have more especially come under my own notice, and then with other matters which I know from experience are at the present time exercising the minds of most of those connected with gas undertakings.

Although it is my intention, in this address, to deal chiefly with the policy and practice of the outside departments of gas undertakings, apart from the manufacture of gas on the works, yet I cannot pass on without referring briefly to some of the more important questions in connection with gas-works. At our last London meeting, we had before us the question of "The Construction of Gas-Works;" and more recently the same subject has been brought prominently before the Institution of Civil Engineers by Mr. Charles Hunt, of Birmingham. This question is a very important one, and no doubt it requires men of very considerable experience and skill to carry out such work in a thoroughly stable, efficient, and at the same time economical manner. Waste of capital occurs if unnecessary strength is added to the various structures required on our works, and risk of accident and undue wear and tear when the necessary strength has not been allowed; and I know of no department in connection with gas undertakings that requires more consideration and skill than the constructional one. To speak more definitely, I would point out, especially to my younger brethren (of whom it is pleasing to see so many present), that, when they are dealing with commercial undertakings like those under their care, they must not forget that a pound should not be spent unless by its use a dividend can be earned sufficient to pay interest upon the sum expended. This condition, according to my experience, will best be satisfied by the erection of good and respectable-looking buildings, and the provision of the best mechanical appliances that can be obtained.

Engineers of gas companies are somewhat differently placed, and have considerably more responsibility towards the shareholders who provide the money, and therefore expect a return, than appears to attach to some members of School Boards, who, having the ratepayers' purse to pull at, develop a fancy for very ornate and palatial buildings in which to enlighten the rising generation, and then, after three years of extravagance, leave the burden of their folly upon the shoulders of others. I trust that most of you will hand down to the rising generation (probably to some of your sons) creditable monuments of your careful forethought and skill. An inordinate expenditure of the capital of an undertaking is unwise. But the various works should be carried out in a good and substantial manner; and at all times good and stable foundations should be secured, especially in the retort-house, where the heat is liable to penetrate a long way below the surface. In some cases, the heat has dried up the subsoil containing vegetable matter; hence a subsidence and great damage done to the superstructure. In connection with the retorts and settings, it is the most economical plan to use the best material to ensure durability; remembering that it costs no more to set good retorts and the best fire material than cheap and inferior ones. Above all things, put down the best machinery for the various duties required throughout your works; not forgetting that it may be called upon to work 24 hours per day for six days of the week, and in many cases, I regret to say, on Sunday into the bargain.

Where the principle of the sliding scale has been adopted, there is no doubt that its introduction has, to a large extent, prevented an unnecessary and inordinate outlay on capital account. It also offers special inducements to gas companies to do their very utmost both to produce and sell gas cheaply, whereby the shareholders and the consumers jointly reap the benefit. In carrying out this principle, however, very great caution must be exercised by those who are responsible for the proper care of the undertaking; for, unless the various works and plant are kept in an unimpaired state of efficiency and stability, by making ample provision for wear and tear and other contingencies out of the revenue for each year,

there will be considerable risk of too much being taken out of the plant, so that the whole concern will become starved and dilapidated—necessitating heavy capital expenditure in after years, to bring the undertaking back to a reasonably efficient state.

The time has arrived when every gas engineer (if he intends to keep to the front) must admit that the question of gaseous firing for heating retorts has been thoroughly tested, and proved to be most advantageous in every way, and that it is capable of being introduced with advantage both in large and very small works. This subject will be dealt with by Mr. Chester; and therefore no further remarks need be made here. In like manner, it has long been accepted that stoking machinery can be very profitably employed in both small and large gas-works. The important question of working up residuals, such as tar and liquor, on your own works is one that requires most special consideration; and the locality may affect the question very materially. A very valuable addition to the store of knowledge on this subject was recently made by Mr. Colson on the practice and experience at Leicester; and it would be well for everyone who requires information upon this point to read his address. The moving of coal, coke, and other materials from place to place in a gas-works is also a subject of great importance, and is at the present time receiving much consideration by myself and many others.

No general remarks upon the manufacture of gas would now be complete without some reference to the subject of enrichment, and the troubles which the adoption of new processes for raising the illuminating power of gas may probably bring. Half-a-century's experience with cannel as an enriching agent has taught us how to use it, and exactly what to expect from its use, and the proportion necessary to give the desired result. Another advantage, which cannot be over-estimated, and which is not even yet fully realized, is that, owing to the cannel being mixed with the coal in the retort, the poor gas and the rich cannel gas are evolved together under the same conditions of temperature, with the result that a tolerably uniform quality of gas is put into the holder. Several processes are now being tried upon a large scale; and no doubt engineers have succeeded in so reducing the cost of manufacture that the question which some of you will probably have to solve is: Which process will best answer your purpose? At the present time, it is difficult to advise you on the matter; but, having had some experience with rich cannel gas mixed with poor coal gas, I shall require some very definite information, obtained from practical working upon a large scale, to satisfy me that gases of such extreme densities, when put into a gasholder, become perfectly mixed, and that a certain amount of stratification in the holder does not take place. Mr. Glover, of St. Helens, will no doubt, after an extended experience, endeavour to satisfy us upon this point. At the present time his policy is to obtain a very large volume of gas, at a high heat, from the cheap coal which he obtains in his district, and then to enrich it with oil gas. This process, he informs me, is working economically and satisfactorily in every way; and, as far as he has gone, he appears to be quite satisfied with the results obtained.

The use of carburetted water gas for enrichment has two serious drawbacks. The first is that it increases the percentage of the highly poisonous carbon monoxide, and so makes leakage more dangerous; and the second is that it shortens the flame, owing to the high percentage of hydrogen and carbon monoxide present in it, which, requiring but little air for their combustion, quickly obtain t in a small space. The consumer judges the quality of the gas far more by the size of the flame than by the light he obtains, and any diminution in its size, therefore, becomes a serious matter; while if the gas is turned on until the old size of flame is obtained, the bill is increased in proportion, and the gas manager has to bear the brunt of his customers' complaints. This is especially the case in the northern district, where coal gas of high illuminating power has long been in vogue. What is wanted is a gas which shall, as nearly as possible, approach coal gas in density, so as to ensure more ready mixing, and at the same time contain those constituents of coal gas which give size to the flame. The process that Professor Lewes brought before us last summer at the Belfast meeting greatly impressed many of the members then present; and it is stated that he has succeeded in carrying out a modification of his ideas upon a practical scale at the Old Kent Road works of the South Metropolitan Gas Company; so that we may expect to have more light thrown upon this very important matter. Evidence has recently been given before a Committee of the House of Commons with reference to the illuminating power of gas in districts where cannel for enriching is difficult to obtain. It has been contended that it is not desirable, either from the point of view of the consumer or that of the Company, to insist upon that small percentage increase in the illuminating power which necessitates the use of expensive cannel to produce it. Mr. Newbigging will deal with this very debatable question; and undoubtedly both sides of it will be forcibly presented to us.

It will be accepted by all of you that gas undertakings now hold a different position generally to what they did twenty-five years ago, owing to differences in the new methods of production on the works, and in the general policy under which they are administered. At one time gas was practically a monopoly everywhere—it being the only good and cheap light that could then be obtained; and gas companies and corporations usually took things more leisurely and quietly, as regards securing new customers, than they are now doing. In some (probably few) cases, they actually prevented the introduction of gas by the unwise and irritating deposit system then in vogue. One of the chief and very proper objects kept in view by every gas undertaking was to pay their maximum dividends, to which all such undertakings are entitled so long as they conduct their business in accordance with the restrictions imposed upon them by the Legislature, which, as a rule, are framed with the idea of being a benefit both to the undertakings and to the public generally. It is well known, if we judge from their methods of working, that the various gas companies and corporations have taken different views as to the way in which they should conduct their business. Some have thought that their duty was at an end after they had erected their works, put down their mains and service-pipes, and filled them with gas. Others were left to deal with the fitting up of the consumers' houses and all public buildings. Some few companies have, from very early times, considered it their business not only to make gas, but to undertake the responsibility of showing the consumers how to consume it economically; and where this practice is carried out, there is no doubt that the consumers, as a rule, get their work done cheaper and better in every way, and they are not then left to the tender mercies of people who do not understand the principle upon which the gas should be consumed and used for its various purposes.

If our many and great undertakings are to increase their usefulness and commercial prosperity, it is of paramount importance that both companies and corporations should take a deep interest in all the departments of their respective undertakings—from the making of the gas on the works, to the lighting, heating, cooking, motive power, and all other purposes for which it is required—and that they should be in a position to advise their customers as to the most economical and scientific way of utilizing gas for all purposes. It is admitted that, if this idea is carried out throughout the country, as is already being done with considerable success by many gas undertakings, you will have some special trades trying to make out that you are interfering with their business. There is, in fact, already an effort being made, by a large section of very respectable ironmongers, who are now endeavouring to form themselves into an association for the purpose of trying to persuade gas companies that it would be to their advantage to hand over entirely to them their business of selling gas-fittings and letting out stoves, &c. My advice to the gas industry is: "Do not accept their suggestions;" and I certainly think that it is very courageous of them to enter upon your preserves, and at the same time to ask you to give up your birthright. You might just tell these gentlemen that, in many places, especially in London, they had the trade in their own hands for years, and made very little use of it. It was proved they were unable to meet the want of the age; hence the gas companies were themselves forced to look after their own and their customers' interests, and increase the consumption of gas by every means at their disposal, and, at the same time, to satisfy the longing desire of their customers, who undoubtedly should be the first to receive their special

consideration. The consumers have certainly shown, by their adaptations of the means offered, that the privilege of cooking and heating by gas, after being put before them in a practical manner by gas companies, has been accepted in a most remarkable manner throughout the country. Many of the important ironmongers are pushing the sale of commodities which are in direct opposition to the interests of the gas industry; therefore it would certainly be unadvisable to leave entirely in their hands the sale of articles which are so vitally important to its welfare. The question arises: Would the 95,000 stoves, in London alone, hired out by The Gaslight and Coke Company and the South Metropolitan Gas Company, have been in use at the present time, if the Companies had not moved in the matter themselves? It so happens that the writer of this address has a knowledge, from practical experience, of this question; and he maintains that to gas engineers belong, as pioneers, the designing, the making, and the introduction of appliances for cooking and heating by gas; and that the "Trade," as they now style themselves, did not commence their manufacture and sale until a more recent period. The late Mr. Sharp, of Southampton, was one of the leading men who gave displays and lectures at the old Polytechnic Institution, and other places, about fifty years ago. Then, again, Mr. Goddard, of Ipswich, in very early days both sold and let out on hire gas-fittings and gas-stoves; and you will find that one of the first papers read by this gentleman before the British Association of Gas Managers was as to the advantages of gas for heating purposes. When your humble servant was articled to the Gas Engineer at Northampton, about forty years ago, the Company at that time possessed large show-rooms, containing cooking appliances and gas-fittings of all kinds, and employed a large staff of fitters, who did all the work in the town. At that period, the making of gas cooking and heating appliances of all descriptions had already been in operation for many years; and all of them were sold to customers, in the ordinary way of business, at a fair profit. This department was kept separate and distinct. In this way a school is provided for training up youths in your special business; and eventually they become highly trained mechanics. These men, in the course of time, are distributed throughout the town, and, in some cases, start in business for themselves; and a gas company has thus special means for introducing and popularizing the use of gas. The writer has always refrained from going into severe competition with the trade; but he has endeavoured to sell them, as cheaply as possible, fittings and other things they did not possess, so that they could make a profit for themselves. Our chief and primary duty is to set an example by putting in pipes of the proper size, and introducing the best kinds of burners for the economical consumption of gas. A gas company does not care for the whole of the business, but only so much as will enable them to protect and further their own interests. My opinion is that, if the public knew of the many advantages possessed by cooking-stoves, there would be very few houses without them. Knowing so much of their intrinsic value, I see no reason why they should not become part and parcel of the ordinary fittings provided for in the building of all houses; and certainly they ought to rank with the ordinary fire-grate and kitchen-range. You will find that some few intelligent architects arrange a place, or kind of recess, in the kitchen, with a chimney overhead, to carry off the steam and the products of combustion. The further questions of the letting out of cooking-stoves on hire, and of their being remunerative in themselves, are very debatable ones. After very considerable experience, my opinion is that the best plan is to sell the stoves out and out to the consumers; but failing this, to let them out with the option of purchase, upon the three or four years' hire-purchase system, which works to the advantage of both the company and the consumer. In large establishments, where the cooking is in the hands of servants, it is very advisable to have a separate meter attached to the cookers, so as to avoid the waste of gas that sometimes occurs.

Besides the examples I have given of what has been done during recent years, it may be well to state that, when Mr. Newbigging was President, he mentioned in the course of his address, when speaking about the daily consumption of gas in a number of towns, one example where the gas consumed during the daytime was the largest percentage recorded at that date. This was at Northampton; and the early introduction of gas-stoves by Mr. Sharp prior to his going to Southampton will account for the proportionately large day consumption in that town. When appointed Engineer at Maidstone, in succession to the late Mr. John Somerville, I found cooking appliances being made on the works; and there again the day consumption is also very large. I certainly did my best to propagate their application in every way; and my efforts in this direction were the means of introducing gas-fires into the houses of every medical practitioner in the town, without exception; and they again recommended them whenever they had an opportunity, on account of being able to keep a sick-room at a tolerably even temperature throughout the whole of the 24 hours. A large number of instances might be cited where the best burners and proper appliances for cooking and heating by gas would not have been introduced if the gas engineers and their assistants had not personally persisted in upsetting prejudices, and in pointing out the many advantages they possessed. Where this is done upon a systematic scale, you are enabled to keep well in touch with the consumers; and though they talk of you sometimes in rather unparliamentary language, yet in the main, by giving them a little attention, you gain their almost universal respect and esteem. At Maidstone, at least 28 per cent. of the consumers use cooking appliances; the gas sent out during the daytime being 40 per cent. during the summer, and just over 50 per cent. during the winter, of the total quantity of gas made at the works.

It is very satisfactory to find that the Standards of Light Committee, after a very long series of consultations and investigations, are about to issue their recommendations to the Board of Trade for the standardizing of Mr. A. G. Vernon Harcourt's pentane one-candle lamp for the future testing of the gas made in the London district. In all probability, if this gives satisfaction in London, it will eventually become generally adopted throughout the kingdom. This Committee, as you will probably remember, invited representatives of the two Gas Institutions to confer with them on the subject. Before meeting the Committee, the chosen representatives consulted together, and decided to make certain recommendations, the chief of which was that the standard for testing purposes should give a light equal to 10 sperm candles. At the conference with the Committee, this recommendation was urged upon them; and it is gratifying to find that they have decided to carry out the suggestions. It is now hoped, and expected, that the unsatisfactory testing with candles will soon be dispensed with—not that I think they are so bad in themselves as they are made out to be; for many of the divergencies in testing arise from the operators not giving full attention to the rules laid down for their guidance when testing with candles. Any system, however, which is more exactly defined, and liable to give a constant and unvarying light, so as to secure the accurate testing of gas, should be hailed with satisfaction both by buyers and sellers. We shall all look forward with considerable interest to the issue of this important report.

After good and pure gas has been made, there yet remains a most important detail requiring attention from the gas engineer; and that is to see that the consumers have the very best burners and appliances for bringing out the full value of good gas. It is well known by you all that the larger proportion of the consumers possess very little knowledge upon this subject. Although much has been written, and papers read over and over again on this subject, I fear that such information seldom gets into the hands of the general public; and it appears to me that the only way to educate them is for gas companies and corporations to undertake the inauguration of local gas exhibitions, to show all the best appliances in use for lighting, cooking, and heating by gas. Public lectures should also be arranged for on a definite plan; and every effort should be made to bring the officials into personal contact with the public.

A short time ago an opportunity was afforded me of impressing upon the gas consumers of Manchester the desirability of improving their present antiquated system of gas lighting, by adopting the modern regenerative or other economical burners, whereby rooms may be ventilated and an equivalent light obtained at a cost from two-and-a-half to three-and-a-half times less than the Corporation would be able to supply the electric light for, from

a large central station, as the following calculations will show:—

Incandescent Electric Lamp.

16-candle power lamp lasts 1000 hours, and absorbs 60 units of electricity, at 8d. per unit 40s. 0d.

Ordinary Gas-Burner with Manchester Gas.

16-candle power is equivalent to 4 cubic feet of gas per hour, or 4000 cubic feet in 1000 hours, cost of which at 2s. 6d. per 1000 feet. . . 10s. 0d.

In the above calculation, I assumed that the Corporation charge the Board of Trade limit of 8d. per unit for the electric light; and even at that figure grave doubts exist in my mind if they would be able, after paying working expenses, repairs, and maintenance, and providing for a sinking fund, to hand over any profits to the Council, as is at present done by the Gas Department.

As a proof that lecturing is useful, I was attending only three weeks ago a meeting of general engineers in Manchester, and was asked by the President (at the desire of some of the members) if I would explain to the meeting what were the best and most suitable burners to adopt. The question arose from the reading of a lecture given by Professor Lewes at the Society of Arts, where he stated that if the best and most scientific burners were used, the gas bills would be reduced. I, of course, did my best to explain the principle of combustion, and the theory upon which good burners were constructed; and I advised them as to the best burners to use, so as to obtain the greatest amount of light from the gas, which would enable them to reduce their gas bills—that is, if they were satisfied with the same light that they had formerly obtained. They were so interested in the subject, that I am to be called upon to further enlighten them on some future occasion. If the advantages of gas are so great over the electric light where the ordinary flat flame was used in Manchester, how much greater must be its advantage when regenerator and incandescent burners are employed, in which $3\frac{3}{4}$ cubic feet of gas produce a light of from 70 to 80 candle power at about one-eighth the cost of the electric light?

You will see that we have made arrangements for visiting the works of the Incandescent Gas-Light Company, where the wonderful light-producing incandescent burners are being manufactured; and many of the members will probably avail themselves of the opportunity offered them. Before leaving the subject of burners, let me advise you that it may be policy on your part to follow the example of your Continental brethren, by more generally letting out on hire large regenerative and other high-power lamps, for which there is a large demand.

It has been my wish to touch upon the question of ventilation—this being a very necessary subject in connection with the use of gas. It would, however, take up a long time; and inasmuch as this is one of the subjects the Technical Committee are working at, I will leave the matter in their hands.

For a long time I have advocated the increase of the pressure in the mains, so that the working of gas-engines, and cooking and heating apparatus can be more confidently relied upon; and it is pleasing to find that the effect of increased pressure in the mains upon a large scale at Leicester (where it has been increased from 10-10ths to 19-10ths during the daytime) has been to reduce the leakage, no doubt on account of the larger quantities of gas passing through the mains for supplying the 377 gas-engines and the 5860 gas-stoves in use during the daytime. The want of pressure in mains has deterred many people from putting down gas-engines, which fact is to be deplored, seeing that they use such large volumes of gas. Therefore, in future, let me advise you to increase your pressure during the daytime, which may induce the public to use gas-engines, and thereby you will reduce your leakage, as was done in the example I have given you.

During the last twelve months especially, numerous clients have consulted me as to some modern notions which have rapidly developed. I refer to the introduction of the prepayment meter system. Several of our members have asked me to mention it in my address; and although a great deal has been said recently upon the subject, yet the fresh information which has been collected and is appended to this address may be of some service. This is my chief reason for spending a little time upon this subject. I remember attending a meeting of the Midland District Gas Managers' Association at Birmingham, when this system was first suggested to us; but the first time I heard of it being applied on a practical scale was at Liverpool, at the Workmen's Model Dwellings, and afterwards by Mr. Valon in the year 1889, when he sent a letter to the JOURNAL OF GAS LIGHTING pointing out that he had laid a scheme before his Corporation. It would be best to give you the letter in his own words—

Increased Facilities for Gas Consumption.

Sir,—My Committee have under their consideration a report of mine on introducing pipes and fittings to houses not at present supplied with gas, so as to give greater facilities for its use—feeling, as I do, that the greatest drawbacks to increased consumption are the first cost of fittings, and the deposits at present demanded from intending consumers.

We have in Ramsgate 4700 houses, only 2200 of which are fitted up with gas; leaving 2500 still to be supplied. Of this latter number, there are 1000 houses with an average rental of from £15 to £30; the remaining 1500 being cottages from £8 to £12 per year.

My proposition is as follows: (1) Fit up any house with iron pipes free of cost, for persons desiring a supply. (2) Supply gas-fittings to those persons at (say) an annual rental equal to 10 per cent. of their cost. These fittings to consist wholly of brackets or side-lights, and not to include gaseliers or fittings of a more expensive type. (3) Instead of demanding a deposit from those having a supply in this way, give them the alternative of paying monthly. These monthly accounts to be collected by what I shall call a "Collecting Inspector" for two months out of the three; the third month the index to be taken, and account rendered in the usual way. All accounts of this class to be payable on demand—that is to say, at the moment the meter is taken; and if not paid at the office within seven days, the gas to be disconnected. (4) I also propose to lend free of cost to any consumer desiring it, a small boiling ring. A thousand of these at 1s. 3d. each would amount to £62 10s. only. Leaving out of consideration for the moment the cottage property, the houses from £15 to £30 per year rental would cost an average of (say) £4 per house for iron pipes. Supposing that the whole thousand be fitted, the total cost would be £4000, the interest on which at 5 per cent. would be £200 per annum. The increased consumption of gas for these thousand houses, taking the average during lighting hours at 10 feet per hour per house, would be about 20 million cubic feet per annum.

It need only be pointed out that, although doubtless it would be some considerable time before the whole thousand houses would be fitted, no expenditure would be incurred without an immediate proportionate return being made; as, of course, houses would only be fitted up as applications were received from intending consumers.

For the present I leave the smallest or cottage property, as I believe should the same liberality be extended to such property it could only be done by the introduction of some reliable prepayment meter, or some system of weekly payment, which I am not at the present time prepared to deal with.

I submit my views with the object of ascertaining whether the engineers and managers of other companies and corporations are doing anything of the kind; and, if so, whether it has resulted in success or failure.

To this letter, inviting engineers to give their experience, there was only one reply, from Mr. Marks, in the JOURNAL for Jan. 29, 1889. His letter said something of the kind had been done some years before at Sheerness. Hence, it is only fair to assume (as was asserted in the JOURNAL at the time) that Mr. Valon is entitled to the credit of having brought forward a proposal to popularize the use of gas, as he was also one of the first to introduce such a scheme in a practical form through the Ramsgate Corporation. Recently Mr. Valon has given me the result of this recommendation; for the Committee decided for it to be tried, and settled the way it was to be carried into effect. He says:

At Ramsgate, houses of a rateable value of £30 and under are fitted up with pipes, brackets, gas-stoves, or other appliances free of cost. A prepayment meter is then attached, which has a stop on the index; and a payment in advance is made by the intending consumer, from 400 feet upwards as the case may be. This is all that the consumer is called upon to pay. A "Collecting Inspector" visits the house once a week; and should the consumer have burned 200 feet, he takes the money for that quantity and puts on the stop of the index 200 feet further. At the end of the quarter, the Inspector takes the index of these meters in the ordinary way; so that a complete check is maintained over the Collecting Inspector by the return of the indices, independently read by another man once a quarter.

To pay for the cost of fittings, the consumer is charged at the rate of 7d. per 1000 feet more than ordinary consumers. The gas is not sold in less quantities than 100 feet, and then in multiples of 100, which renders the collection easy and expeditious. The consumption per consumer averages 14,000 feet per annum. In the three years, we have fitted up 800 houses, and have thus added a fourth to the number of our consumers, from people who could never otherwise have burned gas, owing to the first cost of fitting. The average cost of fitting up these houses is just under £4 per house. By dealing with the total cost as a suspense fund, and carrying the extra amount paid for gas to this account, the cost of fitting these houses will be cleared off in five years.

With us, the coin meters which we had first in use have been a failure. After the introduction of the stop-index meter, persons who still had them in use requested that they should be taken away and a stop-index meter fixed in its place; the consumers in every case preferring to pay from 1s. to 2s. in advance, rather than be constantly troubled to drop coins in a meter which did not always answer to the penny.

With the prepayment stop-index, each collector can attend to 600 houses—that is to say, he visits 100 houses each day of the week, with the advantage that should the consumer have any complaint, or require any advice, he is in constant communication with the inspector of the Company.

A table [see pp. 1168-9] has also been prepared giving some particulars of the prepayment system from 21 different places where it is now in use. It is not my intention to make any very lengthy remarks upon these returns, except in connection with the second and last columns. It is unwise to make such invidious restrictions as are shown in some of the cases; and it would answer your purposes to fit up any house under an annual rental of £30—like Example No. 3. The whole business ought to be self-supporting; and the interest to cover all charges on meter, fittings, wear and tear, and collection, should certainly not be less than 10 per cent. on the total outlay.

It will be seen that there are two methods suggested—one with stop index and payment in advance to collectors; the other the penny-in-the-slot. No doubt, each has its merits and its advantages; and probably it would be found in practice that, in some particular districts, each might do better than the other. These slot-meters have been much improved; and in some cases there is an extra index which records the number of pence dropped in, so that if the money is stolen, there is proof that the same has been put in. We must all recognize that this system has met a very special want. The working classes are in the habit of receiving their wages weekly, and paying their rents and everything in the same way. This simple method fits in well with their views, and is of much value to them. It is well known that, in a large number of cases, these bread-winners lock up their homes in the morning, go to work, and on their return, have to kindle a fire to cook their food. This costs money and time, whereas, upon their return home, they can now light the gas-stove instantly, and cook their food quickly; and looking at it in this sense the prepayment meter may be designated the working man's friend. One of the members of your Council has been called upon by some of his Company's old consumers to put in prepayment meters, so that they can pay more frequently, and so ease them of the difficulty they have in putting the money aside till the end of the quarter.

I have not been able to compare, but am told that, owing to the extra quantity of gas used by the heating and cooking appliances, the prepayment meter consumers burn more gas than the ordinary consumers (with houses of similar size) did formerly.

To give you some idea of the growth of this kind of business in so short a period, I have ascertained the number of meters that have been made, and those on order at the present time, which amount to 67,730. Of these, 27,000 alone have been supplied to the Liverpool and the South Metropolitan Gas Companies; one firm alone having made over 25,000 meters of this kind.

If, however, you take into consideration the vast areas of (so to speak) untilled ground you have before you, which is open to cultivation, these numbers are after all not so surprising; for, in looking at the Board of Trade returns, I find the following figures of a few typical examples of cities and towns:—

Name.	Population.	Number of Consumers.
Belfast	280,000	23,338
Bradford	186,000	51,760
Bristol	310,000	22,600
Carlisle	42,000	6,301
Glasgow	760,000	156,980
Ipswich	56,000	3,050
Leicester	180,000	25,041
Liverpool	614,000	76,500*
Newcastle-on-Tyne	275,000	30,471
Nottingham	250,000	38,005

* Including 12,000 prepayment meters.

The majority of those still without gas is composed largely of the working classes, to whom the prepayment system would be a great boon. Over these, no doubt, most of you will endeavour to cast your net, probably with considerable success. It is, however, necessary for you to make an agreement between yourselves and both the landlord and the tenant, to avoid any difficulty in the future, similar to a case we have recently heard of at Kendal. Herewith are appended two forms of notices for your guidance.

FORM A.

CONSENT to allow Gas-fittings, &c., to be fixed and afterwards to be removed by the_____in a dwelling-house now occupied by_____

_____

being No._____

I, the undersigned, being the landlord of the dwelling-house above described, hereby consent to allow the servants of the_____to fix a gas-meter, pipes, burners, and fittings in the above-mentioned dwelling-house, and to remove the same when they may require to do so; the said Company bearing the expense of making good any damage done to the premises in the course of such fixing or removal. And I hereby acknowledge that the said gas-meter, pipes, burners, fittings, &c., are the property of the Company, and that the same shall not at any time during my ownership of the house be liable to distraint for any rent due by the tenant to me.

AS WITNESS my hand this_____day of_____189__

To be signed by the Landlord or his Agent.

_____

WITNESS to the signature of_____

_____

FORM B.

I_____of_____

hereby agree to consume this Company's gas, and pay for the same by depositing money in the slot meter provided by the Company; such money to pay for gas consumed, as shown by the ordinary index, rental of meter, and hire of gas-fittings. And I acknowledge that the following are the property of the Company, viz.—

Slot meter No._____
Feet of pipe, with connections and blocks.
Pendants.
Brackets.
Governor burners.
Cooking apparatus, &c.

And I undertake that the above-named articles shall not be sold, removed, or damaged (fair wear and tear excepted) whilst hired by me; and I further undertake that the Company's officials shall, at all reasonable times, have access to the same for the collection of money or any other purpose required. And I agree to give the Company seven days' notice in writing of my intention to discontinue the use of same. And I further agree that the Company shall be at liberty to remove the said meter, &c., on giving seven days' notice in writing of their intention to do so.

AS WITNESS my hand_____

It is pointed out by some that we now have two very honourable competitors in the field; and no doubt this idea has aroused, and brought out, the ingenuity and the inventive genius of many. I refer to the electric light and the various cheap light-giving oils that are now in the market. For my own part, I look upon this state of things as a very probable means of bringing gas undertakings and all connected with them to the forefront; and it will ultimately be the means of bringing out the latent talent in the gas industry. Some time ago, that talent may have been dormant for a period; but it has, of late years, become alert and wakeful, and in many cases is putting forth its strength in a remarkable manner. It only remains with you, my brethren, to adhere resolutely in the future to the task you have undertaken, of not only maintaining our industry in its present important position, but to take up the aggressive, and finally show to the world that you are not only now producing the best and most economical light, but that you fully intend to make it the "light of the future" as well.

A number of the general public do not seem to be aware that the electric light is produced chiefly from the same source as you produce light—viz., from coal; the

No. of Company.	In what class of house do you use Prepayment Meters?	Do you provide pipes and fittings; if so, what is the cost of each house and the fittings, &c., you supply?	How much gas do you give for one penny?	What is the price of gas to the ordinary consumer?	How often do you collect from the Prepayment Meters?	Average quantity used per quarter.	Average quantity used per annum.	What interest do you consider necessary to cover cost, fittings, wear and tear, and collection?
1	As low as £8 per annum rent.	One slide pendant for parlour, one bracket for kitchen, one for scullery, and a ring burner for boiling purposes. Cost £4.	22 cubic feet.	3s. 6d. per 1000.	Once a month.	1100 cubic feet.	Not in use long enough to say.	You can see by above particulars.
2	Small cottage property chiefly.	All necessary pipes and two plain lights.	22 cubic feet.	3s. and 3s. 6d. per 1000.	Monthly.	3000 cubic feet.	12,000 cubic feet.	5 per cent.
3	Houses of an annual rental not exceeding £30.	An automatic meter, the necessary service, tubing, &c., together with one swing pendant, two brackets, and one small cooking-stove.	24 cubic feet, or (say) 3s. 6d. per 1000.	2s. 9d. per 1000.	Monthly.	For four months (Nov., Dec., Jan., and Feb.) the average amount per consumer was 3250 cubic feet.	The system has not yet been tried for a year.	Say, 10 per cent.
4	In small cottages.	Up to the present time we have not found it necessary to provide fittings, except a governor burner and meter connections.	28 cubic feet.	2s. 3d. per 1000.	Monthly.	About 2000 cubic feet.	About 8000 cubic feet.	The freedom from risk and bad debts I consider will cover this; but, of course, there is the extra price of gas also to set against this.
5	Houses up to £10 annual rental.	The average cost (employing tradesmen to do the work) has been £3 4s. 9d. per house, inclusive of a 3-light meter, pipes and fittings for sitting-room and kitchen (one pendant and one bracket); also the boiling-stove and a shelf for stove.		4s. 2d. per 1000.	Quarterly; oftener where necessary.		6168 cubic feet.	10 per cent.
6	In all classes where we believe about 10,000 feet per annum will be consumed.	The average cost of meter, connections, comprising pendant, two brackets, boiling-burner, blocks, and all connections, about £3 10s.	20 cubic feet.	3s. 6d., less 2½ per cent. for lighting, with an additional 10 per cent. for cooking, heating, &c., with separate meter.	Once a month in winter, twice a quarter in summer.		About 10,000 cubic feet.	10 per cent.
7	Small shops and cottages.	No.	25 cubic feet.	2s. 9d. per 1000.	Every six-and-a-half weeks (twice each quarter).	2500 cubic feet.	10,000 cubic feet.	
8	Any.	Four governor burners, two 12-in. brackets, two cork-slide pendants, a ring burner, cock and tube, and the necessary compo. pipe, which, with labour, cost about 30s. If cooker is supplied, 8d. per month is charged for use.	25 cubic feet for one penny, 3s. 4d. per 1000	2s. 10d. per 1000.	Monthly. *Note.—We have about 700 slot-meters in use, and are quite satisfied with the results.*		12,900 cubic feet.	We get about 7 per cent., but this is, I think, hardly sufficient.
9	Common.	No.	22½ cubic feet.	3s. 2d. per 1000.	Monthly.	For 34 meters, 100,000 cubic feet for quarter to March 31, 1894.	Not worked 12 months, so cannot give actual consumption.	10 per cent.
10	Cottages of not more than six rooms.	Not house pipes, but fittings—viz., pendant for kitchen, gas boiler, and 6 feet of tubing—the cost of which, together with fixing meter, is 10s.	25 cubic feet.	At present, 3s. 4d. per 1000, but recently increased from 3s. on account of the coal strike.	About every six weeks.		8800 cubic feet.	10 per cent.
11	Usually in houses under weekly tenancy.	Yes, about 27s.	26 cubic feet.	2s. 5d. per 1000, now reduced to 2s. 4d.	About once a month.		About 12,000 cubic feet.	
12	Workmen's.	Yes, three fittings, 25s.	25 cubic feet.	2s. 7d. per 1000.	Collector's discretion.	3000 cubic feet.	12,000 cubic feet.	5 per cent.; 4 per cent. renewal.
13	Principally cottage houses, also small shops.	We do not provide pipes and fittings, except as paid for.	25 cubic feet.	3s. per 1000.	Monthly.		About 8000 or 8500 cubic feet.	
14	Those inhabited by mechanics; weekly rent about 7s.	Yes. Average cost per house is about £6, including service, meter and pipes, one pendant, one bracket, one boiling-ring, or a small cooker, for which 6d. per month extra is charged.	25 cubic feet.	2s. 5d. per 1000.	Monthly.	Total consumed from Jan 1 to March 31, 1894, 154,000 cubic feet.	We commenced this system in November last, and in one district of the town only.	10 per cent.
15	Property up to and in-	Yes. Supply three lights and one Parkin-	20 cubic feet.	4s. per 1000.	Quarterly.	About 2000 cubic feet per meter.	System has not been in use during a whole year, and average therefore, can	8d. per 1000 cubic feet is the sum we allow for interest, reckoning the price of gas to slot consumers

15	Property up to and including 6s. per week rent.	Yes. Supply three lights and one Parkinson B2 griller. Cost per house, including service and meters, £3 18s.	20 cubic feet.	4s. per 1000.	Quarterly.	About 2000 cubic feet per meter.	System has not been in use during a whole year, and average therefore, can only be approximate, at present.	8d. per 1000 cubic feet is the sum we allow for interest, reckoning the price of gas to slot consumers at 3s. 6d.
16	No restrictions.	Do not supply fittings, lay service, and fix meters free.	25 cubic feet.	2s. 4d., 2s. 5d., 2s. 6d. per 1000.	Monthly.		7000 to 10,000 cubic feet.	20 per cent. on cost.
17	One hundred fixed in cottage property hitherto lighted with lamp oil, but containing service-pipes and fittings.	No.	20 cubic feet. 4s. 2d. per 1000 for gas, use of regulator burner, and hire of meter.	3s. 4d. to 3s. 10d. per 1000 net; therefore 3s. 10d. to ordinary cottage consumers.	Twice a quarter in the two winter quarters; once a quarter in the two summer quarters.	*Quar. Feet* *Quar. Feet* Dec. 2100 Mar. 1900 June 800 Sept. 1100 Total, 5900 cubic feet.*		Interest on cost, wear and tear, same as customary; watering, inspection, and collection done at one visit, and at no greater cost than usual—probably less.
18	Rent £25 per annum.	Yes. £5 per house, including service, meter, and fittings. Fittings, four brackets, one pendant, and boiling-stove.	1st. Gas, meter rent, and fittings, 4s. 7d. 2nd Gas and meter rent only, 4s. 3d.	4s. per 1000.	Every alternate week.	Cannot say. Only commenced this prepayment last year; but have put it at about 15,000 cubic feet per house.	Unknown at present.	5 per cent. upon outlay of fittings, &c., and collection to be charged extra.
19	Artisans.	No.	21 cubic feet.	3s. 11½d. per 1000.	Quarterly.	2400 cubic feet.	10,400 cubic feet.	No experience.
20	Cottages.	Only the meter.	20 cubic feet; but for those who burn fairly well, 22 feet.	3s. 4d. per 1000.	At quarterly inspection, and when the collector is in the district.	Have only supplied 10 meters as yet, and those since Christmas last.		We charge extra for the rent of meter. That is our only extra expenditure.
21	Houses of less than £20 a year rental.	One ¾-in. telescope pendant, two ¾-in. single swing brackets, one small boiling ring, and all necessary pipes and connections. The average cost of each house, including service, meter, and fittings, is about £4.	20 cubic feet.	3s. 3d. per 1000.	Monthly.	58 meters in use during the whole of March quarter averaged 2246 cubic feet.	10,000 cubic feet per meter.	The above figures show a return of nearly 11½ per cent. on the outlay of £4. As we only adopted the system last November, we have not yet ascertained the exact cost of wear and tear and collection.

* Partly estimated, as, although the first was fixed July, 1893, the bulk have been fixed since Dec., 1893.

difference is that you make the light-giving gas by the distillation of coal in closed vessels; and that, after the gas has been produced, you have valuable products left. In fact, you utilize the energy in the coal more completely, in a commercial sense, than the electrician can; and this enables you to produce a given quantity of light from gas from three to three-and-a-half times cheaper than the price for which the equivalent electric light can be sold so as to produce the same profit that is being derived from the manufacture of gas. If some of the public like to pay for the electric light as a luxury, there is no doubt that installations within reasonable areas, with gas-engines as the motive power, will be found the most reliable and economical, and, from a sanitary point of view, far better than the large number of steam-boilers that are being put in our midst for the purpose. Only a few days ago, I inspected an installation of electric lighting at a hotel not very far from this building. There were two large semi-portable boilers with undertype engines, and a large room set apart for containing storage batteries for supplying a few hundred incandescent electric lamps; and this plant required at least two men to look after it during the 24 hours. The whole thing looked ludicrous in my eyes, when I knew that many of our village gas-works are erected and managed for a less sum than this single electric installation.

It is now a well-known fact that a gas-main will deliver sufficient gas to generate 5000-horse power, or as much more as you please, at a long distance—say, three or more miles—at from three to four times less than the same power can be transmitted for by electric cables. Again, the "load factor" is a great drawback to the electricians. They cannot store their energy as you do in your gas-holders; hence their fuel account comes out very high per unit produced. In many cases, they use the best boilers and steam-engines; and they will tell you that they can produce, with 2½ to 3 lbs. of coal, one Board of Trade unit. In practice, however, if you look at the accounts of the electric light departments, you will find that they have, in some way or other, used in many cases about 12 lbs. of coal per unit; and how to get over this difficulty has been taxing the brains of electricians for a very long time. I find, from calculations, that The Gaslight and Coke Company deliver from Beckton to London—a distance of seven miles—through only two of their mains, sufficient gas per hour to produce, in ordinary gas-engines, about 125,000-horse power; the power expended in transmitting this quantity being less than one-quarter per cent. of the total. It would be interesting to know the cost of an electric cable to convey this power the same distance, and the loss in transmission.

To carry out the whole of the duties that have just been enumerated, in a thoroughly efficient manner, men are required who have received a practical scientific training, combined with business tact and foresight.

The over-taxed gas manager will accuse me again of suggesting an increase to his burdens; but it is no wish of mine to multiply labour. I only wish to point out that every engineer should be qualified to guide and direct the whole of the operations here indicated; that he ought to be paid well for his services, and that assistants should be appointed under him to carry out any surplus work he cannot well discharge. In fact, if anything, my desire is to raise your status and increase your salaries.

In speaking of a practical scientific training, we should not forget that there are a large number of very valuable

technical schools, some in which we are deeply interested; and there still remain a few theoretical masters at the head of them, who imagine that they can make qualified engineers without the necessity of any workshop training. While I am prepared to admit that in some cases they are successful, the experience gained in connection with the Whitworth Scholarships proves that a practical training is very advisable. The history of these scholarships is interesting. When they were first founded, two classes of candidates were provided for, and two standards of knowledge were required. For candidates who had worked at two of the engineering trades for a period of three years, the scientific examination was the same as for those (called students) who could only boast of a slight acquaintance with engineering tools; but the standard reached need not be so high in the former case as in the latter, because a high proportion of marks were assigned for the practical-work examination, and this handicapped to a considerable extent the student class. In spite, however, of this difficulty, a larger proportion of the student class succeeded in gaining the scholarships; and it was found better by the workmen candidates to devote themselves to study alone, instead of dividing their attention, and working long hours in the shops. The natural outcome of such neglect of the mechanical training was the growing number of Whitworth scholars who became science teachers, professors, and editors of engineering journals, and not engineers at all. Such a result was not what was expected by Sir Joseph Whitworth; and consequently the system of examination was changed several times, until at present it is necessary to have had a practical training of at least three years' duration, besides passing the high examination formerly required. Undoubtedly, a superior class of engineers will now be produced, though it is questionable whether the bulk of them will ever rival, as pure scientists, the old scholars.

A practical training is especially necessary when men are called upon to guide and direct practical men; and it is therefore most advisable for those who have sons to have them well instructed and practised in the use of tools, so that at any time they could direct others efficiently, or, if misfortune overtook them, would still be able to earn a decent living by the sweat of their own brows.

Several other subjects ought probably to have been referred to; but I fear to weary you by adding more—knowing that we have many highly technical papers to read and discuss. It occurred to me that greater advantage would be derived from my dealing more with the means employed for popularizing the use of gas and for facilitating its consumption. You may have excellent works, equipped with every modern appliance, and yet, unless you have sufficient consumers to take the gas produced, your works are of little use, and your labour profitless. The necessity, therefore, remains for us to look well ahead, so as to bring every department into full operation, whereby the utmost advantage and profit may accrue from the undertaking.

Gentlemen, I thank you for your patience in listening so long to me.

The Corrosion of Cast-Iron Water-Mains.—In a recent number of the *Engineer*, a peculiar and interesting case of external corrosion of cast-iron water-mains is recorded; the results being very similar to those now so frequently ascribed to wandering electric currents. The pipes formed part of some private service-mains in the neighbourhood of the Strand, and consisted of two separate 4-inch mains in 9-feet lengths, running side by side, and placed at a depth of some 3 feet below the level of the ground. The mains, which were laid about twelve years ago, were surrounded chiefly by gravel and clay; but the portions at which the corrosive actions took place exclusively were embedded in cinders. The character of the wasting or pitting was such that the holes almost appeared to have been gouged out. This, however, was disproved by the number of lengths affected, which was six. The defective portions were discovered owing to the pipes having in certain cases become so much reduced in thickness as to be unable to withstand the pressure within them. It was ascertained that there were no electric mains in the neighbourhood of the pipes; so that the phenomenon could not have been produced by short-circuiting or earthing. The crown plates of steam-boilers, upon which ashes have been employed as a non-conducting material, have been known to suffer in a similar manner, where any moisture has been allowed to collect; and our contemporary thinks it is quite possible some of the effects now ascribed to electrolytic action may be due to similar causes.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1188.)

During the past week, the general tendency of most markets in the Stock Exchange has been dull. A conspicuous exception, however, was observable in the Funds and other investment securities of the choicest character, to which there is a ceaseless flow of superabundant money that cannot be employed in trade. Most of the other departments, however, though fluctuating slightly from time to time, were on the whole flat. Apprehension concerning coal disputes in the Midlands and the North prejudicially affected rails at home; while the Americans have had another relapse. The Foreign Market also was a little uneasy, lest affairs in Morocco might produce an European complication. The tendency on the whole was, therefore, downward. The settlement was the chief item of the week, and was somewhat heavier, though not in the more speculative concerns. The demands of the Stock Exchange in regard to it were not sufficient to have more than a very slight effect on the Money Market, the condition of which continues to show extraordinary ease. Business in Gas has been considerably quieter than in the preceding week, but not apparently from there being any abatement in the demand. The general characteristic is confirmed strength; and a large number of quotations have made a fair advance. In Gaslights, the "A" was only little dealt in. The price hardly varied from day to day; but the quotation was put up a point. The secured issues were pretty active; and all the debenture stocks rose to the demand. South Metropolitan "B" and "C" pushed steadily upward; but Commercials were quiet and unchanged. Business was quiet in Suburbans and Provincials; but Brentford made a notable advance of 6. Of the Continentals, Imperial was quiet and unchanged; but Union and European were very buoyant. The latter jumped up on the strength of a bonus of 1 per cent. to be received next month. None of the rest offered any salient feature. The Water Companies were active, and were well supported; there being no lack of buyers at advanced prices nearly all round. Grand Junction led with a 7½ per cent. rise.

The daily operations were: Business in gas was not extensive on the opening day; and prices were respectable, although nothing advanced. Transactions on Tuesday were likewise much restricted; but quotations moved up freely. Brentford old rose 3; ditto new, 1; European, ½; and Bombay, ¼. In Water, Kent rose 3; and Southwark, 2. Business was brisker on Wednesday; but it was almost wholly confined to the big companies. South Metropolitan "B" improved 1½; and both Europeans, ½ each. The course of business on Thursday was much the same. Brentford old rose 3 more; and several *ex div.* quotations showed an increase. The market continued quiet and strong on Friday; the only change being a further advance of 1 in South Metropolitan "B." Lambeth tens rose 2; and ditto, 7½ per cents., 1½. Saturday was fully as active as usual; and further advances were scored. Gaslight "A" improved 1; and South Metropolitan "C," 2. In Water, Grand Junction gained 1½; and Southwark, 2.

ELECTRIC LIGHTING MEMORANDA.

Amalgamation of the Edison and Swan Interests—The Portsmouth Corporation Electric Lighting Station; a New Departure—The Surveyor to the Chelsea Vestry on the Misapplication of Refuse Destructors to Electric Lighting.

One more of those financial operations which have been so conspicuous a feature of the development of the electric lighting industry in England was entered into last week, when the shareholders of the Swan United Electric Light Company had an extraordinary general meeting for the purpose of passing a resolution to wind up the Company, in view of a transfer of the undertaking to the Edison and Swan United Electric Light Company. The arrangement in question has been in contemplation for the last two years, and has been discussed at meetings of both Companies, which are, in point of fact, partners in the ownership of the Edison and Swan properties. The Swan Company were proprietors of 60 per cent. of the whole capital of the Edison and Swan Company; the remainder representing the interest of Mr. Edison and his friends. When the two interests were so far amalgamated, there was a difficulty in the way of an entire fusion, in the fact that only the Edison patents for England belonged to the combination, while the Swan patents were secured for Great Britain and the rest of the world, excepting America. The share of the Swan Company in the English Edison and Swan Company amounted to £208,000, while they carried on a separate business in Germany, and also had interests in France. The lapse of the lamp patents in this country, and for the most part also in Germany, has cleared the way for a complete fusion; and, as Mr. J. S. Forbes put it in his graphic style, it is to the interest of all concerned that "the residuum should be brought into the general pot." Under the new arrangement, there will be greater facility of administration, unity of management, and some saving of working expenses.

The scheme is to be regarded as one of the results of the throwing open of the incandescent electric lamp trade to competition. Meanwhile, it has been complained in the electrical journals that, up to the present, there has been no statement made, by those who ought to know, as to the general effect of the expiration of the lamp monopoly on the electric lighting industry.

It is very gratifying to learn from his recent success at Portsmouth, that Mr. Ferranti has not been extinguished by the treatment he received at the hands of the Directors of the Electricity Supply Corporation. In conjunction with Dr. Garnett, the Consulting Electrical Engineer to the Portsmouth Corporation, Mr. Ferranti's firm have carried out for the town a central station system of electric lighting which, as illustrated and described in the *Electrical Review* for the 8th inst., demands at least passing notice as a clever and novel example of electrical engineering. Mr. Ferranti at Deptford may have been—indeed, undoubtedly was—in advance of his time; and naturally the burden of all the accidental and incidental troubles of the Electricity Supply Corporation fell upon his back. Whatever else he may be, however, Mr. Ferranti is never commonplace. Not for him the cheap and easy copying of certain apparently "safe" patterns of plant, which stands for much of the municipal electrical engineering of the day. It is not within our power to describe, much less criticize, the electrical features of the Portsmouth station, which appears to be designed upon altogether new principles. Our electrical contemporary expresses itself with reserve respecting the policy of the Portsmouth Corporation in embarking upon an experimental scheme; but, as it pointedly remarks, "if municipalities do not strike into new paths, we are in danger of becoming fossilized." Moreover, it is a question of putting faith in professional advisers; and of the ability and caution of those engaged in the Portsmouth undertaking there is no doubt. A sufficiency of examples exists in the country to show that there is no advance to be made by repeating so-called standard patterns of electrical plant, which is the best that the majority of the electricians who have the run of municipal work can do. These ingenious gentlemen have, with remarkable celerity, got themselves into ruts. It might, indeed, be argued that it is not for municipalities to spend the ratepayers' money upon electrical experiments; but since there is no private capital to be had for electric lighting ventures, municipal enterprises of the kind offer the only available field for possible improvement of the industry.

The *Electrical Review* is of opinion that the Portsmouth installation "surmounts many of the difficulties, and meets some of the objections which one had felt were almost inherent in electric light systems;" and it declares it to be a stage in the evolution of central station design. Our contemporary has always contended that the day of low-pressure continuous-current central stations, with or without accumulators, is past—or perhaps it would be more correct to say that the localities where such a system could be hopefully established are occupied by as many examples of the principle as are likely to prosper commercially. The great objection to the system in question is, of course, that it is too central. The alternating current, on the other hand, is capable of much more extended application. Portsmouth originally had a fancy for the low-tension continuous plan; but the circumstance of the district of supply extending to a length of five miles, led to the abandonment of the idea of low tension. Eventually, Mr. Ferranti proposed a combined engine and alternator for generating the current, and the use of commutated or rectified currents for the arc lighting. This scheme certainly had a good deal to recommend it in the eyes of the Town Council. Not that we are to suppose the worthy burgesses to be masters of the subject; but Mr. Ferranti's plan was a good deal cheaper than anything the Corporation had previously had before them, and also appeared to be capable of being economically worked. Dr. Garnett approved; and consequently the plan was adopted, and has been carried out. In this way the Portsmouth Electric Lighting Committee became the pioneers of a system which is, in most of its features, novel, and in all respects is new to English practice. One can but hope it will turn out well.

Mr. T. W. E. Higgens, the Surveyor to the Chelsea Vestry, has reported to this authority on a dust destructor, and the possibility of utilizing the heat disengaged by the working of an apparatus of the kind, with special reference to the suggestion of generating electricity thereby. He refers to statements that have been recently put in circulation through the newspapers, to the effect that any town could be electrically lighted for nothing by means of its dustbin refuse; and he shows that in the case of Chelsea this supply of electricity "for nothing" means, under ideal conditions, a cost of more than 3½d. per unit. Even to arrive at this result, Mr. Higgens was fain to take the comparative cost of coal at per unit sold, and the refuse efficiency at per unit generated; "whereas between the two there is a great gulf in the shape of losses in dynamos, in batteries, and in mains, which would sink any company that were to calculate their price for electricity without taking it into consideration." He also declares that since the cost of working and maintenance of the destructor plant must be in excess of that of ordinary engines, the cry of "London lit for nothing" is a trifle delusive at the present time. The report is a damaging criticism of the pretensions of those who would force upon garbage destructors an extra duty which they are not calculated to perform.

THE CONDITION AND PROSPECTS OF INCANDESCENT GAS LIGHTING.

Members of the Incorporated Gas Institute visiting London this week will have an opportunity, of which it is to be hoped they will freely avail themselves, for inspecting the factory of the Incandescent Gas-Light Company, Limited, in Palmer Street, Westminster. The work carried on here is for the moment far and away the most interesting, as it is among the most important, of contemporary developments of the application of coal gas for lighting purposes. We had the pleasure last week of making a thorough examination of the methods and results of the working of this establishment; and we gladly take this opportunity of describing, for the first time in the Journal, the efforts which the Company are now making, under the energetic management of the Secretary (Mr. L. de Fonblanque) and the General Manager (Mr. J. Moeller), to supply the increasing demand for their lamps of patterns suitable for indoor use, and to adapt them to the peculiar requirements of street and outdoor lighting generally. Before going further, we desire to acknowledge here the perfect candour and willingness to answer all questions, and to discuss critical points of the incandescent gas lighting principle, which these gentlemen manifested on the occasion of our visit. There is, of course, nothing to conceal in regard to a patented manufacturing process; but those who are engaged in such businesses frequently make the mistake of trying to cram their wares down the throats of prospective purchasers; ignoring the while any objections that may be raised against their merits. Mr. de Fonblanque and Mr. Moeller are free from this reproach; and one is consequently the better disposed to give attentive hearing to what they have to advance respecting the qualities of the new make of Welsbach lamps.

To begin with the preparation of the "mantles," which is carried out at the Palmer Street factory with the latest improvements patented by Mr. Moeller (see our "Register of Patents," *ante*, p. 486), it is well known that the basis of the article is a short length of cotton netting, like a very open stocking-net, woven into cylindrical form, with one end, which eventually forms the top, turned over upon itself. This is dipped into the solution of nitrate of thorium, to which has been added not more than 2 per cent. of the nitrate of some other rare metal, preferably uranium. The effect of the admixture of this small proportion of another metallic compound to the bulk of the dipping solution is a remarkable illustration of the importance of the "next to nothing" upon which a high scientific authority once discoursed eloquently, to the edification of the Universe. Seeing how small a quantity of the active material it is that constitutes a Welsbach "mantle" in service, the fact that an infinitesimal fraction of this imparts to it all its commercial value is enough to confound the shortsightedness and stupidity of those who jeer at the physical and chemical research that appears to be concerned with "next to nothings."

After the cotton fabric has absorbed its quantum of solution, it is taken out of the bath, and the excess of fluid is squeezed out of it by means of rollers very similar to the humble domestic "wringers." The mantle is now stretched upon a glass mould to dry, and when it is still only just damp to the touch, it is taken in hand by sewing girls, who gather the top together, and insert the asbestos thread by which it is afterwards to be suspended. It is once more stretched upon a mould, to give it its permanent shape; and it is then removed and hung up by the asbestos thread to dry. In the course of this stage of its preparation, the mantle—which has previously been much bigger than the finished article—shrinks considerably. The next stage is the firing, which is done by directing the flame of an atmospheric burner upon the upper end of the suspended fabric. The cotton takes fire, and is wholly consumed; leaving nothing but a skeleton form of the metallic oxides, to which at the same time the nitrates of the dipping solution have been reduced by the flame. This is at first very fragile, and needs handling with the greatest care. It is immediately fired again, however, by placing it over an atmospheric gas-flame, when it instantly shows the brilliancy of incandescent light which it is designed to give in use. This firing strengthens the material; and a third firing with an intensely hot flame of gas under pressure finishes it. Although still fragile, of course, the mantle is not so tender as it was before being tempered; and a final dip into a volatile preserving liquid endues it with an elastic film which renders it capable of being packed in its cardboard box, and handled sufficiently for the purpose of fixing in place in the burner.

The burner scarcely requires to be described. It is a neatly-made and well-proportioned atmospheric burner working well at any pressure of gas from 6-10ths to 18-10ths; and the whole thing now looks much more workmanlike than formerly. The colour of the light is as purely white as can well be attained by any source of light dependent upon heat for its generation. The greenish tint formerly complained of was due to the use of zirconium in the dipping solution; but this has long been abandoned. As a matter of fact, it would be quite possible to vary the colour of the light by altering the composition of the solution. When this has been done, however, there have been loud complaints from users of the system. Pink or yellow

globes, of course, will modify the colour of the incandescent light to suit the prevailing tone of any interior.

We have now to deal with the latest development of the Company's system—its application to street-lighting. This, as will be seen by the abstract translation in another column of a report of Herr Muchall, of the Wiesbaden Gas-Works, is already an established success on the Continent. Mr. Moeller, however, has set himself to make the application popular in England—beginning with London, the most backward of all English cities in this regard; and we wish him all success in his enterprise. With this view, Mr. Moeller has taken in hand the common 14-inch street lantern, as the starting point for the contemplated improvement—although, of course, the better and larger the lantern the easier it becomes to produce a satisfactory effect. Into this lantern is fitted an incandescent burner provided with a flash-light and a chimney ingeniously made of small glass tubes. A mica chimney would answer nearly as well, and can be used if preferred. There is a lever cock for the lamp-lighters' pole; and as the bottom of the lantern is closed, an attachment is provided for clearing the lamp service, if necessary, without touching the burner. At Wiesbaden, a different arrangement was adopted tentatively, for lighting the lamp when necessary without a flash-jet. For several reasons the flash-light arrangement is to be preferred. Several varieties of lamp-fittings are available; but the essence of the improvement consists in this: While the consumption of gas in the street-lamps is reduced from (say) 5 cubic feet down to 3½ cubic feet per hour, the lighting effect, in the case of common 16-candle gas, will be increased from say 14 to 55 candles per lamp, without additional expense beyond that of the first installation. In other words, the saving in gas will clear the extra cost of the mantles and a reasonable allowance for chimney breakages, extra attention, &c.; and thus the fourfold increase of lighting effect will be so much clear gain. This is a consideration that public lighting authorities everywhere will be well advised to take into earnest consideration. Many of them are now infatuated with electric lighting, while they look askance upon all proposals to improve the gas lighting of their streets at the most moderate increase of cost. It is notoriously so in the City of London, where the Commissioners of Sewers are committed to spend six times their former lighting charges for the sake of the Electric Lighting Company. It is open to all the world to judge whether or not they are getting value for their money, albeit the electric arc lighting of the City of London is admittedly the best of its kind in the kingdom. It cannot be denied, however, that the more frequent points of a system of street lighting by gas are a great advantage; and when it is known that it is possible to triple and even quadruple the amount of illumination provided in this way without additional expense, the prospect of electricity superseding gas for this purpose, upon its merits, will become more remote than ever.

Arrangements are in progress for extensive trials of the new Welsbach street-lamps under the auspices of certain of the London Vestries. It is to be hoped that the same course will be followed in the Provinces; and this is a matter in which gas managers will be able to help their local Highway Authorities to improve the appearance and the safety of the streets after nightfall without laying themselves open to the reproach of seeking to increase the lighting account. We do not pretend to give full particulars of the cost of introducing and working the incandescent system of street-lighting, for the sufficient reason that there is as yet no English experiences to go upon in this regard. It is certain, however, that the incandescent lamps now being applied to this purpose are regulated to consume 3½ cubic feet of gas per hour, and cannot with advantage consume more than 3¾ cubic feet per hour. Hence whatever difference there may be between this rate of gas consumption and that provided for under an existing system, is available to bear the extra cost, if any, of improved apparatus. There is an impression upon the minds of many gas managers that the Welsbach light is essentially a thing for the counting-house, the wareroom, or the luxurious interior—like the Argand burner; and that it is too delicate an appliance for street lanterns, railway station lamps, and workshops. As a matter of fact, it is not really so delicate as it looks; and, at any rate, it is of quite as robust a character as the incandescent electric lamp, which is the only thing of the kind comparable with it. There has been trouble with the chimneys, when constructed in the usual way of a single piece of glass. It has often happened that a tiny break in the mantle has permitted a jet of gas to escape and impinge upon the chimney, naturally causing the latter to break, and involving the destruction and replacement of both mantle and chimney. The remedy for this is the glass-rod chimney, made of about 35 round rods of about ⅛ inch diameter, held together at both ends by metal caps. It is obvious that while a jet of gas might break one or more of these rods, the damage would be limited to this; and both mantle and chimney could be trusted to work out their usual term of life. Moreover, the rod chimneys give a distinctly pleasing effect, as they do not show the form of mantle, but refract the light.

With regard to the duration of the mantles in service, this may be taken at 600 lighting hours, and of the chimneys more than twice as long. Where a powerful light-centre is required, a lantern may contain two or more Welsbach burners, with suitable bye-passing fittings. So thoroughly has the whole matter been worked out, with a view to all probable requirements, that there does not appear to be the smallest real obstacle in the way of the application of the Welsbach system to the best thoroughfares of every city and leading town in the United Kingdom during the present summer; and what a boon this would be to the public during the coming winter! Of course, it is a luxurious scale of lighting, which is not necessary for outlying roads, where the casual stone of the mischievous urchin may be expected to work havoc with the public lamps. Outdoor inspectors know where these places are; and they also know that where good public lighting would be most appreciated the lamps rarely or never suffer injury. The experiences of Herr Muchall are eloquent of all these and other considerations of absorbing interest for gas lighting authorities.

On the whole, therefore, we are able to congratulate the present heads of the Incandescent Gas Light Company upon the substantial success already achieved by the system of lighting in question, and to extend to them our good wishes for the further development of the principle which they now have in hand. The early difficulties of the Company and the system appear to have been overcome. There are no more technical secrets to be learned in respect of the preparation of good mantles; and all the processes of manufacture seem now to be settled in accordance with business methods. It may strike the outside public as strange that the representative organ of the gas industry should applaud a system of gas lighting which involves a considerable saving of gas; but it requires little wisdom to perceive that a contented (because prudent) consumer of gas is worth more in the long run to the manufacturer than the wasteful, dissatisfied customer who is quite likely to discover at any moment that he would be as well off with electricity or oil as with the gas of which he neither appreciates the value nor understands the proper use.

NOTES.

The Value of Liquid Fuel.

Mr. G. Stockfleth recently read a paper upon "Liquid Fuel" before the Society of Arts. Seeing that this communication began with the statement that during last year's coal strike the question of using liquid fuel as a substitute for coal in generating steam was much discussed, it might have been expected that Mr. Stockfleth intended to say something fresh about the experiences gained by users of liquid fuel during this period. But this was not the case, since his paper contained hardly any new additions to the stock of knowledge respecting its subject. The author remarked that there is little material difference between the results arrived at by spraying oil fuel by means of compressed air or steam. Looking at the question from the point of view of cost, Mr. Stockfleth does not think it probable that the compressed air for spraying can be produced at less cost than the necessary quantity of steam taken direct from the boiler. He asserts that only a very small quantity of steam is required for doing this work, when the pulverizer is properly constructed; and he declares that no case has come to his knowledge in Russia where the adoption of liquid fuel has augmented, in a perceptible degree, the quantity of feed water used. Speaking in the course of the discussion upon the paper, Mr. E. Charrington stated that in practice the calorific value of astatki comes out as about 10 per cent. better than twice the value of good Welsh steam coal, taking weight for weight. This was the result of experiments with three oil injectors under a large copper at one of the London breweries, which was doing exactly the same work every day. It was found that the astatki is more expensive in London than the green oil, creosote oil, and tar residuals which are also available for use as fuel. Mr. Charrington finds that a ton of mixed green oil and creosote oil is equivalent to about twice the weight of coal. Owing to the limited supply of creosote and green oil, Mr. Charrington is at present burning creosote only. He complained that last year there was a difficulty in getting tar residuals; and he stated, with regard to the consumption of steam by the fuel injectors, that it averages about 2½ per cent. of the total steam generated by the boiler. The steam should be superheated in order to produce the best results.

The Phenomena of Diminishing Light.

It is stated by Herr Carl Kirn, in a communication to Wiedermann's *Annalen*, that the researches of H. F. Weber upon the production of light from incandescent solids have proved that, when self luminosity first begins to be visible in darkness, its tint is not a dark red, as Draper formerly gave out, but a dark fog-grey, which shows itself spectroscopically as a band in the yellow-green region. The temperature at which bodies begin to emit this first visible grey light is much lower than that at which they begin to glow red, and is different for various bodies. The researches of Stenger and Ebert on the limits of visible light next showed that the phenomenon is conditioned by the degree of sensitiveness of the eye to the different colours; this sensitiveness being a maximum for that part of the spectrum where the band of grey light is first seen. It might naturally be expected that the phenomena presented by the extinction of light would occur in the reversed order to those of lighting up; and Herr Kirn has taken the trouble to verify this by observations of the so-called after-glow of Geissler tubes. In the particular tube used in his experiments,

all the usual phenomenon were repeated after an electrical discharge had been passed through it; the bulbs glowing with a yellowish-grey tint for more than half a minute in a thoroughly dark room. The feeble spectrum of the after-glow is continuous, without noticeable dark places. The colour of the light is a characteristic pale yellow grey, which gradually becomes darker as extinction is approached. The place of the final tint corresponds almost with the E line of the solar spectrum, and coincides closely with the region of greatest brightness of the ordinary visible spectrum. The phenomenon of the extinction of the after-glow is therefore the exact reverse of what is observed to take place when solid bodies begin to be luminous.

The Way to Build in Frosty Weather.

It is reported by the Austrian Society of Engineers and Architects that during the construction of the new theatre in Zurich it became necessary to carry on part of the masonry work during the winter. The Contractors sought, from several sources, advice as to how this might best be done; but, as the recommendations were very diverse, the Austrian Society above named were asked to take the problem in hand. Their Cement Committee instituted a series of experiments upon brick and rubble-stone walling with different mortars and cements; varying the temperature and method of application of the water, &c. These walls were built in the depth of winter, with the temperature usually many degrees below freezing-point; and they were pulled down six months later. It was found that, where lime mortar was used, there had been no setting. Portland cement mortar mixed with cold water answered fairly well; and that mixed with warm water was better. When 7 per cent. of salt had been added, the result was very good with Portland cement mortar mixed in the cold. The conclusions of the Committee from these experiments are that, for brickwork to be laid in frosty weather, mortars into which any proportion of lime enters should not be used. Roman cement mortars behave fairly well under such conditions; and Portland cement mortars give good results. The employment of warm water appeared to be somewhat advantageous; and salt materially increased the resistance to frost. The same remarks would apply to stone-rubble walling. The Committee finally recommend that, in laying brick or rubble-stone masonry in winter, only Portland cement mortar should be used, mixed with salt water.

Rotating Sector Disc Photometry.

Mr. Ervin S. Ferry has been experimenting with rotating sectored discs, with special reference to their use in photometry. He finds that, while it is physically true that the proportion of light transmitted by a rapidly rotating sectored disc, to the total incident illumination, is equal to the ratio of the total aperture of the disc to its entire surface, yet the effect of this light upon the retina will not always show the same ratio. With mixed light, containing elements of different luminosity shining upon the retina, a rotating sectored disc will appear not to cut off all the elements in equal proportion, but will intercept most strongly the elements of low luminosity. With any given light, the error of the rotating sectored disc increases as the aperture of the disc diminishes. In the case of ordinary illuminants, the error is negligible when the total aperture of the disc is more than one-half of the whole superficies; but it rapidly increases as this aperture is diminished. Mr. Ferry has confirmed experimentally the deduction of Von Helmholtz, that if a point of the retina is excited by a light which undergoes regular and periodic variations, and which has the duration of its period sufficiently short, it produces a continuous impression equal to that which would result if the light emitted during each period were distributed uniformly throughout the duration of the period. Mr. Ferry tested the validity of this law by observations of monochromatic light throughout a wide range of luminosity and wave-length. Not the slightest deviation from the law of Von Helmholtz was detected.

Briquette Fuel.—At a recent meeting of the Institution of Civil Engineers, Mr. W. Colquhoun read a paper on the subject of "The Manufacture of Briquette Fuel." The author described the various English and Continental methods of agglomerating slack coal; and various agglomerating agents were detailed, and their local advantages discussed. The characteristics of good pitch, derived from coal tar, renders that agent, however, in every way the most suitable. He said that by the use of from 8 to 9 per cent. of pitch, slack coal might be agglomerated into a form having calorific qualities nearly equal to large coal. In support of the latter contention, he cited the results of three experiments with English briquettes which gave 8·41 lbs., 8·77 lbs., and 8·99 lbs. respectively as the weight of water evaporated from and at 212° Fahr. per pound of fuel. The average evaporative power of several of the best Welsh steam coals was 9·33 lbs. Careful experiments made by M. Marié on the Paris, Lyons, and Mediterranean Railway gave as corresponding figures for three descriptions of French briquettes, 8·88 lbs., 9·15 lbs., and 8·68 lbs. respectively. Costs were quoted of making briquettes in works in England, in the North of France, and in Belgium; and instances were cited of the suitability of the same process for the agglomeration of charcoal dust, sawdust, coke breeze, friable iron ores, and cement. An appendix to the paper gave the annual production of briquettes in various countries.

TECHNICAL RECORD.

STREET LIGHTING WITH INCANDESCENT GAS-BURNERS.

An exceedingly interesting series of experiments has been carried out in Wiesbaden, by the Manager of the gas-works (Herr Muchall), in the employment of Welsbach incandescent gas-burners for outdoor lighting. As the trial was on a fairly large scale, the results, as recorded in the following translation of his report, are instructive.

When, about two years ago, the incandescent burners of Dr. Auer von Welsbach reappeared, they were taken up in Wiesbaden, as everywhere else, with certain mistrust, in consequence of the previous unfavourable results obtained with them; and new trials were made with great caution. I was especially of opinion that they would hardly be suitable for street lighting. The first trial in the photometer-room, after many hours' burning, showed such favourable results, that I tried a lantern in the works' yard with a "C" burner, of about 100 litres consumption, to ascertain if it would stand the test in the open air. As this test seemed to result favourably, two lanterns in a public street were furnished with incandescent burners; and as these tests were also encouraging, we fitted—still cautiously and hesitatingly—one lamp on the 3rd of December; on the 10th, 16 burners upon a four-light candelabra, with special lanterns; on the 12th, 17 burners; and on the 23rd, one lamp. It was intended to stop at these 37 burners, in order to study what influence the approaching winter, with its frost, snow, storms, and rain, would have upon them. The result is given below.

As regards the installation, it was our principal point to utilize the existing lanterns; and this was done with the best results. The lantern we use is a four-sided one, with closed top; and it was provided in 1884, after many trials made by myself, with reflectors of enamelled iron or porcelain, which, contrary to the usual practice, were fixed point downwards. This causes the light not to deflect entirely downwards in the lantern, where there is already sufficient light, but to spread to a great distance. This results in a more even lighting of the street. Such an arrangement improves the appearance of the lantern, especially at night-time, as the highly illuminating reflector can be seen from a considerable distance; and thus the lantern has a much better effect. The lantern is also provided with the outside lighting arrangement invented by me.* This allows the lower flaps to be dispensed with. The bottom can consequently be closed in with glass; and, besides other advantages, a more windproof lantern is obtained. This improved lantern could be adapted, without further alteration, for the incandescent system, by removing the ordinary flat-flame burners with regulators, and substituting incandescent burners. The lighting effect thus obtained was generally admitted to be good; and one could not help feeling the satisfactory impression produced when an incandescent burner, with its full light, is compared with the light given by an ordinary street-lamp.

At first there was a difficulty with the lighting of the lanterns, which was done by means of a ladder, as it did not seem advisable to continue the first test with bye-pass burners, especially as it was of importance to keep the maintenance charges as low as possible. As the lighting with a ladder was suitable for the first few trial lanterns, but impossible for general use, I tried to adapt the outside lighting arrangement, already mentioned, to the incandescent gas-burners. This succeeded very satisfactorily; so that the lighting is done with the ordinary spirit-flame by the men who light the other lanterns. The lighting arrangement is between the reflector and the top of the lantern, so that it cannot be seen. It forms an admirable guard againt wind and rain; so that, even in the greatest storm, only a flickering is noticeable. The extinguishing of a flame, or even a strong flickering, was never observable.

In regard to our experience with respect to details, it was found in the winter of 1892-3 that a good pressure is always desirable for effective lighting; and that the burners, notwithstanding their small holes for gas, are not more liable to blocking of naphthalene or to freeze than ordinary burners. Atmospheric deposits had no noticeable effect; neither was it observed that great cold or strong wind had any deleterious influence upon the direction of any of the parts. But there seems reason to believe that dampness has a tendency to break the mantles from the top. The cleaning of the chimneys (which, with the exception of one of mica, were all of glass to start with) was not required, as they only became slightly dirty; and in most cases they broke before it was necessary to clean them. It was noticed that the whole of the lantern glass, as well as the reflector, remained much cleaner than the panes of an ordinary lantern, and consequently could be more easily kept in good order. Besides, they had much greater durability, on account of the diminution of heat and the use of an enclosed flame; so that the lanterns did not break nearly so much as those with open flames.

The principal item of maintenance was, of course, the renewal of the mantles and chimneys. It was observed that the breaking

* See JOURNAL for March 20, p. 530.

of a chimney was followed by the destruction of the mantle, and was also the result of a defective mantle. As soon as the mantle has a hole in it, the jet of flame thus created keeps the chimney unequally heated. This it cannot resist, and breaks; thus also breaking and destroying the mantle. With a mica chimney, the jet of flame causes it to become dull at that point, so that it more or less loses its transparency. It is advisable to put this dull side towards the houses, or turn it so as to make the top end the bottom one. For this reason, it is advisable not to use conical but straight mica chimneys. With regard to the support of the mantles, it must be stated that the cast-iron rods seem to possess an advantage over the magnesian rods, as they do not break so easily. The fork of the rods should not be too flat, but should be deep, so that the mantles hang well down, and are not blown out when lighting.

The 37 burners having been continued through the winter to the fullest satisfaction, though the lighting was done by means of a ladder, a further installation of 33 lanterns fitted with incandescent burners, was made on the 30th of March, 1893; so that there were at our disposal in all 70 lanterns, of which nine were night lanterns for observation. It was found during the summer months that a number of burners admitted little or no gas; so that they must be blocked. The reason of this was that the respective burners were full of small flies, insects, &c., which had been attracted by the brilliant light, and had crept through the crevices of the lantern, and through the four openings of the Bunsen tube into the interior of the burner, where they were killed by the gas, and thus, in course of time, filled the whole space. After finding out this cause, the bottom part of the burner was surrounded by a fine gauze of metal wire, so that the four openings became inaccessible without in any way blocking up the holes. This arrangement had a good result; and a further advantage was obtained in the prevention of the lighting back of the flame, which occasionally happened. It was further noticed that the cross tube leading to the outside was in time covered with salts, resulting from the deposition of the products of combustion which had passed the tube, especially of the carbonic oxide, in connection with vapour acting upon the brass. This fact, once observed, offered no further difficulty, as it was sufficient to instruct the lamplighter to pass a cleaner into the tube when lifting off the burner, and then remove the accumulated deposit. To what extent this can be avoided by using other materials has to be ascertained. Nevertheless, the new arrangement found more favour; and the burning of the mantles and their exchange on the spot, &c., were done systematically, so that useful material might be collected for further observation from a practical and financial point of view.

From the outset, special value was attached to noting how many mantles and chimneys were required for each burner, and how many hours they lasted, both by days and by burning hours. These notes extend in the first case, until the 15th of July; and the results arrived at are set forth in the accompanying table. The figures here presented show that, on an average, for each 1000 burning hours we require 1·90 new chimneys, and 1·42 new mantles; and that, up to the date mentioned, the medium duration of a chimney is 531 hours, and of a mantle 705 hours, and that the longest duration of a chimney is 1920 hours, and of a mantle 1493 hours. It could, therefore, be stated with tolerable certainty that the new system of lighting would not be more expensive, but would in all probability be cheaper in practice than the old; leaving out of the question the threefold lighting power. According to measurements made by the photometer, it was found that a mantle would last up to 2000 burning hours, and give, with the consumption of 100 litres of gas at 40 mm. pressure, the following results, measured horizontally: After burning 100 hours, 60 candles; 200 hours, 60 candles; 300 hours, 56 candles; 400 hours, 56 candles; 500 hours, 58 candles; 600 hours, 58 candles; 700 hours, 56 candles; 800 hours, 56 candles, 900 hours, 54 candles; 1000 hours, 52 candles; 1100 hours; 53 candles; 1200 hours, 52 candles; 1600 hours, 48 candles; 1700 hours, 47 candles; 1800 hours, 47 candles; and 2000 hours, 46 candles.

When these results became known, we proceeded with the extension of the new lighting arrangements. We put up on Aug. 18, 1893, an additional 57 lamps; on the 23rd, 27 lamps; on the 26th, 45 lamps; on the 30th, 1 lamp; on Sept. 22, 41 lamps; on the 23rd, 11 lamps; and on the 25th, 6 lamps. We had consequently a total of 242 lamps installed. The results obtained with this number up to Oct. 1, 1893, were tabulated in the same way as the former statement. These figures, which need not be repeated in detail, show that, on an average, during 1000 burning hours we use 1·17 new chimneys, and 1·73 new mantles. Therefore the medium duration of a chimney is 589 hours, and of a mantle 579 hours; while the longest duration of a chimney is 1921 hours, and of a mantle 1741 hours.

Further installations were made as follows: On Oct. 19, 1893, 2 lamps; on the 25th, 39 lamps; on Dec. 8, 1 lamp; on the 22nd, 5 lamps; and on the 23rd, 16 lamps. Consequently, on Jan. 1, 1894, we had installed a total of 305 lanterns, of which 70 were night lanterns. The results obtained by this number were compiled up to the last-named date in the same way as in the foregoing statement; but a repetition of the details can be dispensed with. The observations lead to a definite conclusion that the duration of the mantle does not depend, in the first place, upon the number of burning hours,

GROUP A.—*Four-Flame Lanterns.* GROUP B.—*One-Flame Street Lanterns.*

No.	Date of Installation.	No. of Burning Hours.	No. of Renewals.		Extreme Duration of	
			Chimn'ys	Mantles.	Chimneys.	Mantles.
	GROUP A.				Days Hrs.	Days Hrs.
1	Dec. 10, 1892.	962	5	6	.. ..	.. .. *
2	" "	962	4	4	.. ..	.. ..
3	" "	962	3	3	187 962	187 962
4	" "	962	3	1	187 962	187 962
		3,848				
	Four lanterns	15,392	15	14		
	GROUP B.					
1	Nov. 9, 1892.	1,120	2	2	157 892	108 594
2	" "	1,120	3	2	81 547	127 544†
3	Dec. 3, 1892.	2,005	7	7	79 632	81 646
4	" 12, "	903	2	3	119 685	96 588
5	" "	903	..	..	.. ..	185 903‡
6	" "	903	2	..	50 278	185 903
7	" "	1,976	2	1	65 724	124 1149§
8	" "	903	1	0	124 500	185 903
9	" "	1,976	2	3	175 1920	124 1493§
10	" "	903	2	1	102 493	144 779
11	" "	903	1	3	148 792	84 531
12	" "	903	6	1	53 343	134 743
13	" "	903	3	1	86 540	129 724
14	" "	903	1	1	156 819	156 819
15	" "	903	2	1	161 834	161 834
16	" "	903	2	2	97 363	88 319
17	" "	903	0	1	185 903	99 517
18	" "	903	3	2	76 490	83 526
19	" "	1,976	8	5	76 780	104 1347§
20	" "	903	1	3	141 604	92 396
21	" 23, "	826	1	..	165 798	174 826
22	Mar. 30, 1893.	266	1	..	67 238	77 266
23	" "	266	1	1	49 160	49 160
24	" "	266	1	..	67 238	77 266
25	" "	599	1	1	48 346	48 346§
26	" "	266	1	1	73 255	73 255
27	" "	266	1	..	67 238	77 266
28	" "	266	3	3	67 238	67 238
29	" "	266	..	..	77 266	77 266
30	" "	266	2	1	63 226	63 226
31	" "	266	..	..	77 266	77 266
32	" "	599	..	..	77 599	77 599§
33	" "	266	..	..	77 266	77 266
34	" "	266	..	..	77 266	77 266
35	" "	266	2	..	67 238	77 266
36	" "	266	..	..	77 266	77 266
37	" "	266	..	..	77 266	77 266
38	" "	266	..	..	77 266	77 266
39	" "	266	2	1	61 206	61 206
40	" "	266	2	1	45 178	45 178
41	" "	599	2	2	57 466	57 466§
42	" "	266	..	..	77 266	77 266
43	" "	266	..	..	77 266	77 266
44	" "	266	..	..	77 266	77 266
45	" "	266	..	1	77 266	40 156
46	" "	266	..	..	77 266	77 266
47	" "	599	..	..	77 599	77 599§
48	" "	266	2	1	58 191	61 202
49	" "	266	1	1	63 226	63 226
50	" "	266	1	1	47 148	47 148
51	" "	599	..	..	77 599	77 599§
52	" "	266	1	..	61 202	77 266
53	" "	266	..	..	77 266	77 266
54	" "	266	3	2	43 145	43 145
	Total . .	34,084	78	56		

* Special lanterns. † Night lantern, burner with bye-pass. ‡ Mica chimney. § Night lanterns.

but upon outside circumstances, which are dependent upon time. We note that these circumstances—accidental breakages, street vibrations, cleaning of the lantern, the lighting of the burner, storms, rain, damp atmosphere, &c.—and the fact that with a night lantern these accidents happen less frequently, prove the above statement, that the mantle should, without exception, claim a longer duration as regards burning hours than in the case of ordinary lanterns, whereas at the time of examination the days taken are the same for both. But we are justified in drawing another conclusion—viz., that the chimneys and mantles last longer upon brackets than upon street candelabra. For instance, if the 19 candelabra lanterns fixed on Dec. 22, 1893, are compared with the 22 bracket lanterns fixed on the same date, it will be found that the former used by Jan. 1, 1894, 41 chimneys and 31 mantles; whereas the latter used 38 chimneys and 25 mantles. This makes for one candelabrum lantern 2·2 chimneys and 1·6 mantles; and for one bracket lantern, 0·6 chimney and 1·1 mantles. As the total number of each kind was the same, and the exterior circumstances of both were similar, a direct comparison can be made; and the final result, as stated above, seems to be justified. Of course, we have to take into account the vibrations to which the candelabra are exposed in higher degree than the brackets.

To get a clear idea of the cost of the new incandescent system of illumination, it is, of course, hardly possible to consider the burners which have been in use for a longer period. If we take those installed up to March 30, 1893, the result is that, on an average for each 1000 burning hours, 1·74 chimneys and 1·89 mantles were required. So that the medium duration of a

chimney was 574 burning hours, and of a mantle 527 hours; while the longest duration of a chimney was 921 hours, and of a mantle 2694 hours. We must note, however, that the result was influenced unfavourably because the four-light candelabra required many mantles on account of these lanterns having no reflector at the beginning, which had a bad effect upon the regulation of the draught, and, further, because glass chimneys exclusively were in use. Even if we take the previous results as a basis, the calculation is that the cost of a chimney, including the wages to the man to put it up, and other expenses, is 0·50 mark (6d.); and for a mantle, including wages for burning off and putting on, 1·7 marks. Therefore the cost for the renewal of the chimneys and mantles for each 1000 burning hours is, on an average: For chimneys, 0·90 mark; for mantles, 3·42 marks—total, 4·32 marks. The initial cost for an incandescent burner has to be taken as 12 marks. For depreciation we have to take 20 per cent. per annum, or for an average of 2300 burning hours, as in the present case, 2·40 marks or 1·04 marks for each 1000 burning hours. The expenses for the maintenance of the lanterns, especially the lighting and extinguishing of the burners, cleaning, uniforms of servants, repairs, &c., amount, according to our experience, to the same as the ordinary street lanterns—that is, 7 marks for each 1000 burning hours. The consumption of gas for the incandescent burner is 100 litres per hour. This makes, for 1000 hours, a consumption of 100 cubic metres, which, at 10 pf. (our charge at cost price), comes to 10 marks. The cost price of incandescent street lighting system for each 1000 hours is consequently as follows:—

	Marks.
Consumption of gas	10·00
Renewal of chimneys and mantles	4·32
Depreciation of burners, &c.	1·04
Lighting and maintenance of the street illumination	7·00
Total	22·36

The cost price of the ordinary street lighting with flat-flame burners for 1000 hours is as follows:—

	Marks.
Consumption of gas (0·180 cubic metre for one hour= 180 cubic metres, at 10 pf.).	18·00
For repair and maintenance of lanterns	7·00
Total	25·00

Thus, by the use of Welsbach burners, we obtain a substantial saving, which, in consideration of the experiments made during so short a time, must remain outside our calculation; but there is the increased illuminating power given by the new light as compared with the old one, which yields from two-and-a-half to three times the light. For these reasons, I should say, as a final result, that the new system costs about the same as the old; so that the great illuminating power given by the new light, as against the flat-flame burner, with a consumption of 0·180 cubic metre of gas, is the principal result. How far this can be improved upon by the use of mica chimneys must be ascertained by further experiments.

Before concluding, I must point out that at the present time (March, 1894) we have 431 of the lamps in use; representing about one-fourth of the total of the existing street lanterns.

Mr. Leonard G. Hall, Manager of the Rhyl Gas-Works, who was a pupil of Mr. J. Hepworth, of Carlisle, and subsequently his assistant, has just been appointed Manager of the water-works, which have recently been taken over by the Rhyl Improvement Commissioners.

Coal in the United States.—The production of coal in the United States is acquiring considerable importance. It was returned for 1893, upon the basis of statistics collected by the United States Geological Survey, at 181,488,612 tons, of which 127,498,212 tons were bituminous coal and 53,950,400 tons anthracite coal. The value of the bituminous coal was computed at $121,671,009; and that of the anthracite, at $85,684,465, making an aggregate of $207,355,474. The 53,950,400 tons of anthracite coal, produced in the United States last year—were mined in Pennnsylvania. The principal production of bituminous coal was also effected in that State; the output for 1893 having been 44,098,053 tons, of the estimated value of $35,208,473. The second great coal-producing State of the American Union is Illinois, which mined 19,949,564 tons in 1893; the estimated value being $17,827,595. Ohio ranked third, with an output of 13,140,770 tons, valued at $12,253,794; and West Virginia fourth, with an output of 10,619,985 tons, valued at $8,225,312. The following States each produced more than 1,000,000 tons of bituminous coal in 1893: Alabama, 5,138,693 tons; Colorado, 3,677,526 tons; Indiana, 3,721,751 tons; Iowa ,3,931,026 tons; Kansas, 2,553,641 tons; Kentucky, 3,005,010 tons; Maryland, 3,651,631 tons; Missouri, 2,897,428 tons; Tennessee, 1,908,974 tons; Washington, 1,264,877 tons; and Wyoming, 2,439,311 tons. It will be seen that American coal-mining is at length beginning to acquire great importance, and attempts are being made to develop an export trade. These attempts have not been attended with any very decided results at present; but it is quite possible that the Americans may one day send coal to Europe as freely and as systematically as they now supply it with wheat.

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

The Profit-Sharing System.

SIR,—The necessity for the adoption of some plan whereby the interests of capital and labour can be identified, and peace with goodwill between them attained, is so great, that I return to the charge,* and gladly take up the challenge contained in your issue of the 29th ult. to show how the identical system of profit-sharing that two sliding-scale gas companies have put in force can be applied to non-sliding-scale companies and municipal gas undertakings.

You said you wished not to be carried away by my advocacy, or by the success of the experiments under my immediate direction, "and so be led to pretend to believe that the whole labour problem has been solved thereby, so far as the work of gas making is concerned. We wish we could think so, and could conscientiously call upon all gas-works administrators to go and do likewise. . . . The simple fact, however, that Mr. Livesey himself cannot at present suggest how his method is to be applied to gas undertakings under municipal ownership, and that he has not even schemed its application to non-sliding scale companies, must be our justification for calling his system a colourable imitation of the real thing." You then say these "undertakings are carried on for profit;" and "if, then, a method of profit-sharing is, in truth, the 'real thing,' its operation should be applicable under all circumstances whenever or wherever the profit is made." And I say it *is* so applicable, without any difficulty whatever, where there are men sufficiently convinced of its advantages, and sufficiently in earnest, to take the trouble to carry out the scheme.

In my paper on the subject presented to the Institution of Gas Engineers in 1892, I said: "There was the principle of the sliding-scale; and this principle for this purpose can be adopted quite as easily, and quite as effectively, by non-sliding-scale companies, and by corporations owning gas-works, as by sliding-scale companies. All that is necessary is the arbitrary fixing of a fair initial price; and to agree that for every reduction of 1d. per 1000 cubic feet that is or can be made in the price of gas, all the officers and workmen shall have annually, or at the end of a shorter term of service"—to meet the case of the winter men—"a certain percentage on their salaries and wages." You are right as to the use of the word "arbitrary" in the sense in which you employed it—that is (*vide* dictionary), "depending on will or discretion, not governed by any fixed rules." But, although reminding me of my use of the word, the preceding sentence, relating to municipal and non-sliding-scale undertakings, was forgotten; and this, I repeat, I stand by.

Take the case of the Crystal Palace District Gas Company. It was in my mind; and I regret I did not suggest two or three years ago that the system of profit-sharing now adopted should be introduced. But the time seemed hardly to have arrived. I could not point to several years' successful working of the system elsewhere. I knew that one, at least, of my colleagues was strongly opposed; and he who was most favourable advised me that it would be better that the suggestion should not come from me. But had circumstances been different, where would have been the difficulty in adopting, in every particular, the identical system that is now in vogue? We could have then, as we have now, adopted the same "arbitrary," but fair, initial price, and have agreed to the same scale of bonus on the salaries and wages; for in either case it is the voluntary act of the Directors, and has now no parliamentary sanction. Moreover, if we had adopted it before we came under the sliding-scale, it would have been on precisely the same footing as that on which it now stands.

The only difference between a sliding-scale and a non-sliding-scale company that may adopt this system of profit-sharing is that in the former all three partners—shareholders, employees, and consumers—are pecuniarily directly interested in a reduction in the price of gas, whereas in the case of the non-sliding-scale company, only two—employees and consumers—are directly interested; the interest of the shareholders in reductions being indirect and somewhat remote. But there is no other difference, and no greater difficulty in the adoption of the system in one case than the other. In fact, there is no gas company in England, whether sliding-scale or not, in which, allow me a free hand, I would not undertake to introduce and give a fair start to this system of profit-sharing. The difficulty is not in the system, which is simple enough, or with the employees, who will jump at it, and will say, on having it put to them, as was said to me by men at both the South Metropolitan and the Crystal Palace District works: "I wish it had been introduced twenty years ago." The real difficulty is in the Directors, who do not see the necessity, and therefore do not care to take the trouble. Many of them hold the opinion that the thing is right, but it is only an opinion; and, as the late Morley Punshon, the eloquent Wesleyan, once said: "Men's opinions are light as gossamer; men's convictions rule the world." So, until we get earnest men, thoroughly convinced of the necessity of taking active measures to reconcile capital and labour, nothing will be done.

So far as the system itself and the employees are concerned, there would be the same ease in its application to municipal gas undertakings. What is to prevent a Committee from fixing an initial price for gas, and undertaking to give a certain bonus on salaries and wages for every reduction of 1d. in that price? For instance, take the case of Birmingham, where the average price of gas last year was 2s. 5d. per 1000 cubic feet, and where the amount of profit to be appropriated in aid of rates is fixed at £25,000 a year. Could not the Gas Committee or the Corporation, if they were so minded, fix, for the purpose of profit-sharing with their employees, an initial price of (say) 2s. 8d., in order to start with a bonus of 3 per cent., and say that 1 per cent. bonus on salaries and wages should be paid for each 1d. reduction in the price of gas below 2s. 8d., and the thing would be done. Birmingham is selected because the contribution in aid of the rates is fixed and limited; any further advantage going to the consumers. But, said Mr. Hunt, in effect, no Gas Committee or Town Council would agree to anything in the shape of an addition to salaries or wages.

* Mr. Livesey's previous letter appeared in the JOURNAL for the 29th ult., p. 1017.—ED. J. G. L.

The difficulty—the only difficulty, therefore—that stands in the way of the adoption of this system of profit-sharing, lies with the governing bodies, alike in the case of gas companies, sliding-scale or otherwise, and of municipal gas undertakings. I know the question of cost is a stumbling-block. The objection to adding in this way to salaries and wages is felt by boards of directors equally with committees of municipalities; but this is purely imaginary. The cheerful and improved working of the men under the influence of profit-sharing earns the bonus, which is not really a charge upon the undertaking; but if it were, the freedom from anxiety and from the danger and loss of strikes and disputes would be well worth it all. Moreover, there is cost and loss on the other side. Quite lately, at a gas-works which I need not name, beyond saying that it is one under the influence of the Birmingham branch of the Gas Workers' Union, objection was taken to drawing the coke from the retorts direct into barrows; the demand of the Union being that it should be drawn on to the floor, and there quenched, and afterwards shovelled up into barrows for removal to the yard. How the matter was settled I know not; but it is worth something to be delivered from such tyranny.

No man engaged in the gas industry, and probably no man in the kingdom, has given more (if so much) attention to this question during the last five years than myself. I have therefore earned the right to speak; and I feel it my duty to give utterance to my conviction that there is no more important and pressing question affecting the industrial life of the kingdom than this of reconciling the interests of capital and labour. It is for employers to make the first move. If they neglect this duty, the forces of evil, of distrust, of antagonism and enmity are at work, and will, unless arrested, separate still more widely employer and employed. There is, however, a simple remedy, which attains the object in view, and brings an abundant reward of peace and contentment which it is my earnest desire should be experienced by everyone connected with gas-works in the kingdom.

I send you a copy of the Crystal Palace District Gas Company's profit-sharing rules, which I trust you may be able to publish, and thereby show any who may wish to adopt the system how it can be worked.

GEORGE LIVESEY.

Reigate, June 14, 1894.

[Comment on the above appears in our Editorial columns to-day. The enclosure referred to in the last paragraph of the letter is given elsewhere, p. 1180.—ED. J.G.L.]

The Incorporated Gas Institute and the Work of the Late Gas Companies' Association.

SIR,—Your correspondent "An Old Member," in the last number of the JOURNAL, is, I think, under some misapprehension as to the intention of the Council in the matter of the work of the late Gas Companies' Association. So far as it was explained to me, the Council never thought of the present members of the Institute being charged with the expense of these further proceedings, but that the gas companies should contribute as heretofore, only at a much lower rate; and that this rate, whatever it might be, should be paid to the Institute. If a sufficient number of companies were willing to contribute, there might be at the end of the year a small surplus available for another purpose, or otherwise the matter be given up.

W. LIVESEY.

June 16, 1894.

The Working of the Prepayment Meter System.

SIR,—Enclosed I hand you tabulated statement of replies as to prepayment meters, &c., sent in response to my letter in your columns on April 24 last. I also enclose the statement submitted to my Committee, who do not see their way clear to recommend the Council to extend the system, as either my calculation is wrong, or those Companies who have adopted the system lose money.

No doubt the secret lies in the quantity of gas consumed. If this amounted to 10,000 cubic feet per annum, then success would result; but, even with this quantity, I can scarcely see how some towns make it pay at the price they charge.

The question is one of great importance to the whole of the profession; and I hope you will be able to procure, through the medium of the JOURNAL, such an expression of opinion as will lead to satisfactory results being obtained from the adoption of the system.

J. S. CRANMER.

Stratford-upon-Avon, June 11, 1894.

[ENCLOSURES.]

The first of the enclosures referred to in the above letter is the tabulated return incorporated by Mr. West in his Inaugural Address to The Gas Institute to-day (see *ante*, pp. 1168-9). The second enclosure is as follows:—

Estimated cost of fitting up a cottage with iron service supply-pipe, main cock, prepayment meter, meter stays, compo. pipe for interior, one cork-slide pendant, two brackets, boiling and broiling stove, blocks, elbows, hooks, screws, and fitter's time complete.

List of Fittings, &c.	Net Cost of Fittings and Labour.	Wear and Tear and Depreciation.	Annual Charge.
Iron service supply-pipe and laying, and main cock	10s. 6d.	5 p.ct.	0s. 6¼d.
Meter	45 0	10	4 6
Compo. pipe	1 8	15	0 3
One pendant	3 6	15	0 6¼
Two brackets	4 3	15	0 7½
Stove	7 0	20	1 4½
Blocks, elbows, hooks, and screws	1 0	15	0 1½
Fitter's time	3 3	15	0 5¾
Contingencies	3 10		
Total	80s. 0d.	—	8s. 5¼d.

Taking as a basis that 6000 cubic feet of gas will be used by each consumer, the above charge upon capital expended is proposed to be met as follows:—

In our own case, the gross profit upon the gas undertaking for the last three years has averaged 1s. 2d. per 1000 cubic feet of gas. This would represent, upon 6000 cubic feet of gas	7s. 0d.
Add to this 1s. per 1000 cubic feet extra proposed to be charged upon the gas supplied through a prepayment meter	6 0
Total	13 0
Deduct meter-rent not charged	2 0
	11 0
Annual charge, as above	8 5¼
Leaving to pay interest on capital employed and provide sinking fund	2 6¾
As capital so employed could not be borrowed for (say) longer than 30 years, 5 per cent. upon capital must be allowed. This on £4 is equal per annum to	4 0
Showing a loss for each meter of	1 5¼

I will now take another way of showing the results that may be expected to accrue from the system:—

Our present price for gas to this class of consumer is 3s. 2d. per 1000 cubic feet. This, upon 6000 cubic feet, would be	19s. 0d.
Add 1s. per 1000 cubic feet as above	6 0
Total	25 0
Deduct meter-rent lost	2 0
	23 0
Deduct above charge upon capital employed	8 5¼
Leaving for gas consumed and to pay interest on capital and provide sinking fund	14 6¾
As gas costs 2s. per 1000 cubic feet, 6000 cubic feet at 2s.	12 0
Leaving, as above stated	2 6¾

Calculation for 100 Meters.

Capital employed, at £4 each meter, &c.	£400 0 0
Receipts—	
600,000 cubic feet of gas at 4s. 2d.	£125 0 0
Payments—	
Interest on capital and to provide sinking fund at 5 per cent.	£20 0 0
Depreciation upon 100 meters, &c., as per above statement of 8s. 5¼d. each	42 3 9
600,000 cubic feet of gas at 2s.	60 0 0
Loss of meter-rent upon 100 meters	10 0 0
Total payments	£132 3 9
Deduct receipts	£125 0 0
Difference (loss)	£7 3 9

High v. Low Grade Gas.

SIR,—The article under the title of "The Case for Low-Grade Gas" which appeared in your issue of the 29th of May contains much matter of interest to the gas profession at the present time; and, as you make reference to my paper recently read before the Incorporated Institution of Gas Engineers [see *ante*, p. 1050], I send this letter in the hope that it may lead to a fair and impartial discussion of the whole of the questions suggested by your article. As it appears that the arguments I used in favour of a 19 to 20 candle standard for gas are considered good, I am encouraged to add a few words by way of criticism of some of the statements made therein.

First let me say that I fully agree with the writer of the article when he says: "The interest of the public demands that the gas which is now so incontestable a necessary of town life shall be of the best quality that can be produced in the locality at a reasonable price." Fortunately, it is now possible, in every town of any size in this country, to enrich the natural coal gas up to what I believe to be the best standard, if the consumers' interests are to be considered—viz., 19 to 20 candles—and still be able to sell such gas at a cheaper rate, light for light, than could be obtained from low-grade gas in the same town.

The writer of the article has, for some reason or other, chosen to overlook the fact that enrichment can now be provided at less than ½d. per 1000 cubic feet; and he has based his calculations on what may be called the old method of enrichment. He therefore assumes that a gas of 20-candle power would cost from 6d. to 10d. per 1000 cubic feet more to produce than would a gas of 15 to 16 candles; and, on this assumption, he says that, if 25 per cent. more light is obtained from 20-candle gas, it will cost the consumer 25 per cent. more. I am surprised that such a statement should be made. The fact is that the increased lighting value to the consumer of a 20-candle gas would be 60 per cent. over the so-called natural coal gas; while the increase in cost would not be more than 10 per cent.

It is hardly necessary to follow the writer in his ingenious arguments in favour of a poor gas for lighting purposes. I think that gas engineers generally will not be prepared to drop the flat flame out of consideration, so long as 80 per cent. of our gas is consumed as flat flames.

A very foolish error the writer falls into when he assumes that because the Scotch capital is not brilliantly lighted with the rich gas supplied to it, it is impracticable to have a good lighting effect from 20-candle gas. There are a number of towns in the North of England, where 19 to 20 candle gas is used, where the public lighting will compare well with London, while the cost is much less.

The theory that a good light is only to be obtained from light which is diffused and of considerable area and mild brilliancy, may be carried too far, and ought only to be considered along with the circumstances under which gas has to be consumed in living-rooms, where it is not desirable to increase the products of combustion by lowering the light-giving power of gas.

In conclusion, I must say that it would be a great mistake to allow it to be assumed that there is any difficulty in burning 19 to 20 candle gas in such a way as to develop its highest light-giving power. The domestic governor burners now made by several leading firms consume the gas perfectly, without the production of any soot.

S. GLOVER.

St. Helens, June 15, 1894.

[We did full justice to Mr. Glover's argument for 20-candle gas; but since he appears desirous of initiating "a fair and impartial discussion of the whole of the questions suggested" by our article, it may be as well to remark that people may possibly hesitate to engage in controversy with a gentleman who accuses one of falling into "a very foolish error" to start with. As to our other failing, in having, "for some reason or other, chosen to overlook the fact" vouched for by Mr. Glover, the "fact" in question, as expounded in the third paragraph of his letter, is not of such a character that every gas manager would profess to be equally "dead certain" about it. We nevertheless welcome all contributions to the discussion of this most interesting subject, since the obvious and only reason we can have for dealing with the question at all is our duty to the gas manufacturing and gas consuming public.—ED. J. G. L.]

Sheffield Corporation Water Department.—The Water Committee have recommended the Sheffield Town Council to make application to the Local Government Board for their sanction to the borrowing of £10,888 for the capital expenditure of the department for the year ending March 25, 1895.

Alexandria Water Company.—The report of the Directors of this Company for the year ended March 31 last states that there was an increase of 129 services during the year; but the gross receipts show a decrease of £367, due to large reductions in the supply to the Government and the water carriers. There was a reduction of £686 in the working expenses. The depreciation fund has been brought up to £3800; and the profit and loss account has been debited with £243—the amount of premiums paid on new services during the past year. A sum of £681 has been written off for bad debts; and the balance of profit and loss account, after providing for the interim dividend paid on Dec. 15, 1893, amounts to £22,532, which allows of the payment of a dividend of 5s. 6d. per £5 share—making a total return for the year of 8s. per share, and leaving £92 to be carried forward.

Torquay Gas Bill.—Last Tuesday, the Unopposed Bills Committee of the House of Lords had before them the report of amendments to the Torquay Gas Bill. In reply to questions as to amendments in the Bill, Mr. J. Kitson, the Secretary of the Gas Company, stated that the maximum price of gas fixed by the Bill was 4s. 3d. Formerly it was 5s. 6d.; and the Corporation of Torquay had assented to 5s. It was, however, subsequently fixed at 4s. 3d. The price of gas at the present time was 3s. 3d.; and it had never ranged higher than 3s. 6d. and 3s. 9d. The existing low price was due to the fact that the Company had an exceptionally favourable contract for coal, and the advantage of moderate charges for freight. A sliding-scale would, no doubt, have been preferred by the Company, as being for them a more advantageous arrangement; but as they had only had negotiations with the Corporation on the basis of a maximum price, and not of a sliding-scale, they chose to keep faith in the matter, and accordingly assented to the principle of a maximum price. The Bill was ordered for third reading.

Salcombe Water Supply.—Mr. T. Codrington, one of the Inspectors of the Local Government Board, held an inquiry at Salcombe last Tuesday into an application by the Local Board to borrow £3000 for works of water supply, in virtue of an agreement entered into with the South Devon Land Company and Mr. C. E. Newton-Robinson. The proposal was objected to by Mr. J. Ford, who submitted an alternative scheme. Mr. F. Beesley, the Water Engineer engaged by the Board, gave particulars as to the project, which he said would furnish more than double the present supply of water (22,000 gallons a day), at a cost, including land, of £2900. Mr. R. H. Worth, on behalf of Mr. Ford, condemned Mr. Beesley's scheme as a bad and expensive one: whereas his own, although it would cost £3146, or £246 in excess of the other, would, he said, entail only £20 a year for working expenses, as compared with £80. His estimate included £300 compensation to Mr. Ford for carrying the pipes through his land outside the Board's district, and £1370 for laying the mains at the turbines; while the whole of the water rights would be sold for £300. The Inspector inquired if an analysis of the water proposed to be taken had been made. Mr. Worth said it had not. The Inspector said the Local Government Board would not sanction the works outside the Local Board's district unless three months' notice was given.

Growing Gas Consumption at Widnes.—The Gas Engineer of the Widnes Corporation (Mr. Isaac Carr) has advised his Committee to give early attention to the abnormal increased rate of gas consumption, in consequence of which it will be necessary to provide additional carbonizing plant much earlier than was anticipated some time ago. The maximum make per diem during last winter was 701,000 cubic feet; and the increased consumption for the week ending the 9th ult. was 19·87 per cent. Notwithstanding the long stoppage of works during the recent holidays, the increase so far compared with last year is 15·86 per cent. The estimated maximum make per diem for the coming year, based on 20 per cent. increase, is 840,000 cubic feet; and the present capacity of the carbonizing plant (188 retorts) is only 940,000 cubic feet a day. The greatest number of retorts in use at one time last winter was 142; but an increase of 20 per cent. on last year's maximum would require 28 more retorts—leaving the narrow and unsafe margin of 18 retorts. For the year ending March, 1882, 73,074,000 cubic of gas were made, against 150,383,000 feet during the past year. Mr. Carr is strongly of opinion that instructions should now be given for the sulphate house and plant, engines, exhausters, boilers, condensers, &c., to be removed to their proposed new sites this year; and an extension of the retort-house made next year.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress has been made with Bills:—

Bill read the first time and referred to the Examiners: Hebden Bridge Gas Bill.

Bills read a second time and committed: Electric Lighting Provisional Orders Bill (No. 2), Gloucester Corporation Bill, Wemyss, &c., Water Provisional Order Bill.

Bill referred to a Select Committee, consisting of Lord Brougham and Vaux (Chairman), Lord North, Lord Saltoun, Lord Digby, and Lord Truro, to meet on Thursday, June 14: Neath Corporation Water Bill.

Bills reported: Consett Water Bill, Southend Water Bill, Torquay Gas Bill, Wemyss, &c., Water Provisional Order Bill.

Bills read the third time and passed: Carshalton and Croydon Gas Bill, Electric Lighting Provisional Orders Bills (Nos. 3, 4, 5), Fulwood Local Board (Water) Bill, Gas Orders Confirmation Bills (Nos. 1 and 2), Water Orders Confirmation Bill.

A petition against the Plymouth and Stonehouse Gas Bill has been presented from the Corporation of Plymouth.

HOUSE OF COMMONS.

The following progress has been made with Bills:—

Bills read the first time: Electric Lighting Provisional Orders Bills (Nos. 3 and 4), Gas Orders Confirmation Bill (No. 2), Huddersfield Water-Works (Tramroad) Bill, Water Orders Confirmation Bill.

Bill recommitted: Swinton Local Board Bill.

Bills reported: Abertillery Local Board Gas and Water Bill, Bacup Corporation Water Bill, East London Water Bill, Falkirk Corporation Gas Bill, Harrow and Stanmore Gas Bill, Kendal Corporation Gas and Water Bill, Southwark and Vauxhall Water Bill, Thames Conservancy Bill, Wakefield Corporation Bill.

Bills read the third time and passed: Colne Valley and Central Middlesex Water Companies' Bill, Hebden Bridge Gas Bill, Millom Local Board Bill.

HOUSE OF COMMONS COMMITTEE.

(*Before Sir* JOSEPH PEASE, *Chairman; Mr.* BRUNNER, *Mr.* BAIRD, *and Mr.* RANKIN.)

Monday, June 4.

LONDON WATER COMPANIES' BILLS—THE SINKING FUND CLAUSE.

To-day the Bills of the East London, West Middlesex, and Southwark and Vauxhall Water Companies were again under consideration, on the question of what form of sinking fund clause should be adopted. The matter had already been discussed at the meeting of the Committee on the 2nd ult. (*ante*, p. 918).

Mr. PEMBER stated that he had been in communication with the Local Government Board, as suggested by the Committee, and had proposed to them a clause which provided, in the case of the East London Company, as follows:—

There shall be carried to a sinking fund in each year, from and after the expiration of three years from the issue, from time to time, of any debenture stock under the powers of this Act, a sum equal to 1¼ per cent. on the amount of such debenture stock, so long as the rate of dividend payable on the ordinary stock of the Company amounts to 8 per centum on such ordinary stock; and if such rate of interest exceeds 8 per centum, then for every additional ¼ per cent. in any year on such ordinary stock there shall, for that year, be carried to the sinking fund an additional sum equal to ¼ per centum on the amount of such debenture stock in respect of each such additional ¼ per centum so paid in that year up to, but not exceeding, a sum equal to 2¼ per centum upon such debenture stock. Such sinking fund to be held and applied by the Chamberlain of the City of London, as trustee, for the purpose of purchasing and holding shares or stock of the Company, and of investing the dividends thereon, with a view to extinguishing capital of the Company, or for such other purposes as Parliament may from time to time determine. No shares or stock so purchased and held shall confer any right of voting at any meeting of the Company.

To this clause the Local Government Board objected; urging "that the object of the clauses of 1886 and 1891 was to secure to the sinking fund the difference between the interest paid by the Companies on the new capital raised under the Acts and the average percentage of the different dividends and interest paid on all the capital of the Companies, whether share capital or borrowed, after allowing the Companies 1 per cent. for management." This, Counsel contended, was a false assumption, and one that was not justified either by the wording of the clauses or any declaration by the Committee. In the case of the capital now proposed to be raised, he urged that it would produce no profit at all, but would, on the contrary, tend to a reduction of dividend. On this point he called

Mr. *W. B. Bryan*, M.Inst.C.E., the Engineer of the East London Water Company, who said that the average profit per house over the whole district was 11s. 2d.; but he did not think this rate would be maintained in future. As regards the capital now proposed to be raised, it would be infertile for the purposes of dividend.

Mr. BIDDER then addressed the Committee for the Southwark and Vauxhall Company, and urged that it would be unjust to that Company to apply the sinking fund to the new capital, or at least to a great portion of it, as it would certainly not increase the earning power of the undertaking.

Mr. PEMBER, on behalf of the West Middlesex Company, further addressed the Committee; contending that their case differed from those of both the other Companies, as they (the West Middlesex Company) were paying their full 10 per cent. dividends, and all the benefit

of any future profit would go into the pockets of the consumers, and not of the Company. Therefore every shilling they took for the sinking fund would be to the direct injury of present consumers.

Mr. LITTLER, in reply, said the whole question was whether the Companies should be allowed to raise capital under such conditions that it would inevitably have to be bought at an enhanced price when the works were taken over by the consumers. The more perfect their appliances were rendered by the increased capital, the larger would be the number of years' purchase they would receive. On behalf of the Corporation, he submitted the following clause:—

Creation of Sinking Fund.—From and after the expiration of three years from the issue, from time to time, of any debenture stock under the powers of this Act, there shall be carried to a sinking fund in each half year a sum to be calculated as follows: The money obtained by the issue of the stock (including any premiums) shall be deemed to earn profits in each half year at the average rate per cent. earned for that half year by the whole capital of the Company for the time being, whether share, stock, or borrowed capital. This average rate per cent. shall be ascertained by calculating the rate per cent. which the amount paid for that half year as dividend and interest on all the said capital would yield if divided equally over the whole amount of such capital. From the profit earned by the money obtained under this Act, calculated at the said average rate per cent., there shall be deducted the amount paid during the half year by way of interest on debenture stock issued under this Act, together with —— per cent. on the amount of such debenture stock for management. In the event of the undertaking being acquired by a public authority, the allowance of —— per cent. for management shall not be deemed to have increased the capital value of the undertaking, or be the subject of compensation or purchase. Such sinking fund to be held and applied by the Chamberlain of the City of London, as trustee, for the purpose of purchasing and holding shares or stock of any of the eight Metropolitan Water Companies, and of investing the dividends thereon with a view to ultimately extinguishing the capitals of such Companies, or for such other purposes as Parliament may from time to time determine.

Mr. FREEMAN, for the London County Council, said his clauses were practically the same as Mr. Littler's, with the exception that the Council did not think there should be an allowance for management; the management expenses being taken out of revenue.

Mr. RICHARDS, for the Essex County Council, asked that the Treasurer of the County of Essex should be included as trustee with the City Chamberlain.

Mr. LITTLER said, if that were conceded, West Ham, for which he also appeared, and which was a county borough, should be included.

Mr. PEMBER and Mr. BIDDER having replied for their respective Companies, the proceedings were adjourned till the following Friday.

Friday, June 8.

The Committee having deliberated to-day in private for about an hour,

The CHAIRMAN said: The Committee have given every attention to this difficult and somewhat intricate question. They are impressed with the great public advantage which would arise from applying the same clause as regards a sinking fund to all stocks raised under the Acts of 1886, 1891, and 1894. The main differences in the action of the clauses of the Acts of 1886 and 1891 are: (1) That the former excludes from the operation of the sinking fund, moneys raised by way of premium, although by the provisions of the Act the premiums form a portion of the powers granted; (2) the clause of the Act of 1886 also provides for "extinguishing" the stock purchased (on the meaning of this portion of the clause high legal opinions are at variance), while the clause of the Act of 1891 includes the premiums in the operation of the sinking fund, and makes the Chamberlain of the City of London a trustee for holding the stock purchased, and for investing the dividends. As the principle of the non-cancellation of the stock purchased by the Chamberlain has been admitted, and as only £1046 stock of one Company (the East London) has been bought, one difficulty is practically removed. The sums which have been raised by way of premium, and which, by the clause inserted in the Act of 1886, or the clauses in the Act of 1891, are prevented from coming under the operation of the sinking fund, are not large. In the case of the East London Company, the amount is £89,700; and in that of the Southwark and Vauxhall Company, £54,388. The Committee propose to take the clause of the Act of 1891 as the standard for the moneys raised under the three Acts of 1886, 1891, and 1894, without in any way interfering with payments already made to the Chamberlain. This continues the allowance of 1 per cent. to the capital raised by the Act of 1894; and as the actual expenses of management are previously provided for, it practically forms a fund for meeting contingencies, and going towards interest on such storeage reservoirs and filter-beds as for a time may be unproductive. But this allowance must not form part of any calculation of value if the works are sold to a public authority. The Committee do not approve of that portion of the proposals of the Corporation of the City of London which would enable the Chamberlain to purchase the stock of any Water Company; but they adhere to the law, as laid down in the clause of the Act of 1891, which confines the purchase to the stock of the Company contributing the fund. They do not assent to the proposal to alter the position of the Chamberlain as trustee by adding colleagues, as suggested by the County Council of Essex. They look upon his position as being that of a trustee for Parliament; and, in their opinion, it would be against the public interest that he should remain for many years in the position now assigned to him. They do not think he should exercise any vote or take part in the management in respect of the shares vested in him. The Committee are of opinion that the stock should be raised at not less than 3¼ per cent., and not more than 3½ per cent.; and that it should be an auction stock redeemable at the end of 25 years by the Company. The Committee desire to insert in each Bill words to the effect that the works for the full amount of storeage and filtration should be commenced as soon as practicable after the passing of the Acts, and be proceeded with with due diligence. While it might be difficult to enforce this action, the words inserted would serve to indicate that the Committee decidedly agree with the view expressed on this subject in the report of the Royal Commission; and for this reason especially they have authorized this large outlay. The expenditure is, I believe, now allocated in each of the Bills before the Committee. It was not so in the case of the West Middlesex Company; but I believe it is so now. [Mr. PRITT assented.] The Committee are also of opinion that the stock—£1046—cancelled by the Chamberlain in the case of the East London Company should be reissued to him, to bear dividend from the commencement of the year next after the passing of this Bill. That embraces, I think, the views of the Committee; but I can easily understand that it will take a little carrying out in clauses. We have tried to put it as clearly as we can. The great principle is that we continue to the Water Companies what we consider a very handsome allowance in the way of 1 per cent. upon the new capital; and this would apply practically to the 3¼ or 3½ per cent. stock—to the whole of the new issue of capital.

WEST MIDDLESEX WATER BILL.

The Committee then proceeded to deal with the clauses of the West Middlesex Company's Bill.

Mr. FREEMAN proposed the insertion of the following clause:—

Before creating any debenture stock under the powers of this Act, the Company shall apply to the purposes of the works by this Act authorized the sum of £107,725 12s. 11d., shown by the last yearly accounts of the Company to have been accumulated out of profits after paying the maximum authorized dividends, and shall also apply to the like purposes the sum of £7500 standing to the credit of the repairs and renewal fund: Provided that the Company may carry forward from time to time a balance not exceeding at the end of any year £10,000 in addition to the amount of the reserve fund.

Mr. *H. L. Cripps*, the Parliamentary Agent to the London County Council, gave evidence in support of the clause. He stated the conditions under which the amounts referred to had been accumulated, and contended that this accumulation was not warranted by the statute.

The CHAIRMAN: We know you are a very sound lawyer; let me ask you what is the remedy against a company which accumulates beyond its statutory powers?

Witness said that was a very interesting, and rather difficult question. He thought any consumer could have refused to pay the sum demanded from him at any time, because it was an illegal charge over what the Company had a right to levy; being more than was required for their statutory dividend. But this was practically impossible, for individually the consumers could not take action in these matters against the London Water Companies; and until recently there had never been a local authority that could act in their behalf. He thought it was just possible that combined action on the part of the consumers might compel the redistribution of this fund among the consumers individually; but he would rather hesitate to give a legal opinion upon the matter.

Mr. PEMBER, on behalf of the Company, opposed the clause, and pointed out that, with so large a capital, it was absolutely necessary to have something beyond the £20,000 reserve fund to rely upon in case of any accident. He denied that there had been any illegality in the accumulation; but he agreed to a certain portion of it being set apart for works, if the remainder were placed to the reserve fund.

Ultimately the clause was altered as follows, and agreed to:—

Before creating any debenture stock under the powers of this Act, the Company should apply to the purposes of the works by this Act authorized the sum of £52,000, being part of the sum of £107,725 12s. 11d. shown by the last half-yearly accounts of the Company to have been accumulated out of profits after paying the maximum authorized dividends, and shall also apply to the like purposes the sum of £7500 standing to the credit of the repairs and renewal fund; and, notwithstanding anything contained in section 8 of the West Middlesex Water-Works Act, 1852, the Company shall be entitled to set aside the balance of the said sum to augment the reserve fund of the Company: Provided that the Company may carry forward from time to time a balance not exceeding, at the end of any year, £10,000 in addition to the amount of the reserve fund after providing for the payment of the maximum authorized dividends.

The remaining clauses were then agreed to; and the Chairman was directed to report the Bill, as amended, to the House.

EAST LONDON WATER BILL.

Mr. COHEN proposed the insertion of the following clause:—

From and after the passing of this Act, the Company shall furnish monthly to the Water Examiner records of the amount of water pumped from each well, the water-level during the period of pumping, and the water-level when at rest; such levels, together with the surface-level, to be given in heights or depths above or below the Ordnance datum of the United Kingdom.

This clause, he explained, was brought forward in consequence of the observations in the report of the Royal Commission on the subject of getting accurate and reliable information as to the actual effect of the operations carried on.

Mr. BRUNNER remarked that there was no provision in the clause as to the framing of regulations.

Mr. COHEN said there was not; but they thought the clause would be sufficient. They did not wish to impose any unnecessary burden.

Mr. *A. R. Binnie*, the Chief Engineer to the London County Council, was then called. He said that, during the investigation before the Royal Commission, it became part of his duty to inquire into the water-level in the chalk below London; and both he and the Commission found great difficulty in obtaining any information as to the wells that had been sunk by the Water Companies. As the Companies drew from the chalk a larger quantity of water than any private consumer, it was a matter of the utmost importance, seeing that the water-level under London was now falling at the rate of 12 to 18 inches a year, that a careful record should be kept, in the public interests, of the pumping operations. The Companies made a return month by month to the Local Government Board of the water they drew from the river; and he thought they ought to do the same with regard to the water they pumped from wells.

Mr. PEMBER admitted that it was an important matter; but he asked, as it was so important, whether the method of carrying it out ought not to be very carefully considered.

Witness said the Royal Commission had put it on record that it should be done; but there had been no enactment yet.

Do not all the recommendations of the Royal Commission presuppose some day the passing of a very comprehensive measure?—One could not well introduce a Public Bill dealing with all the Companies;

but when a single company are in Parliament I see no objection to the recommendation of the Royal Commission on such a simple matter being carried out. The Water Examiner is not appointed under the Private Acts of the Companies, but under the General Act of 1871; and I presume if his powers are insufficient, it is because the General Act is insufficient, for there is at present no obligation upon the Companies. To bring in a Bill to amend the General Act would be rather a large measure for so small a thing.

Why should it be? You have been speaking for the last three or four years about purchasing the undertakings of the Companies. You said you were ready to bring in a Bill next year for their purchase. As the life of the Companies is going to be very short, where is the extreme anxiety for hurrying on a clause like this, in the course of one year, against one Company?—I cannot say anything against your argument, if you do not see that this is a public requirement. It is not a matter for the County Council, or anybody else. It is a public requirement which the Royal Commissioners think is necessary.

Mr. PEMBER: As you agree with me that it is not a matter for the London County Council, and that there is no necessity for hurry, I shall not carry it any farther.

The CHAIRMAN said the clause puzzled him, and also, he believed, his colleagues. With all respect for the draftsman, it did not seem to him to be either English or sense. It did not say on what day of the month the records were to be furnished to the Water Examiner, or in what length of time—from the beginning of the world or when. The water-level during the period of pumping was to be recorded; but every stroke of the engine must alter the level. Then as to the surface-level of the well, that never altered.

Mr. PEMBER: I quite agree, Sir. Do you give it up, may I ask?

The CHAIRMAN: Personally, I give it up. I do not know what my colleagues' views are.

Mr. COHEN admitted that the clause was not very well worded.

After some further discussion, the clause was amended, and submitted as follows:—

From and after the passing of the Act, the Company shall, in accordance with regulations to be framed by the Local Government Board, furnish monthly, to the Water Examiner, records of the amount of water pumped from each well during each month, and the variations in the water-level during each period of pumping.

Mr. PEMBER then addressed the Committee. He objected to the insertion of the clause, on the ground that it was not right to pick out one of the recommendations of the Commissioners without giving the Companies the benefit of all the others. So little care and thought had been given to the preparation of the clause, which had come upon them that day for the first time—it was drawn in such a clumsy way—that the County Council's representative had to admit that the Chairman's criticism of it was as just as could be. To do any good, such a clause ought to be generally applied, not only to the East London Company, but to all the other Companies, and to every person who was authorized to pump from the great water reservoir underneath London. Further, he objected to the clause because it proposed to amend a Public Act by means of a Private Act, which was not a right thing to do.

The Committee consulted for a short time in private. On the re-admission of the parties,

The CHAIRMAN said: We have come to the conclusion that we had better not take this clause, or any modification of it; and that it is rather for Parliament to deal with the recommendations of the Royal Commission. They are very important; and we should not like to put into the Bill a clause that was not to be a standard clause.

Mr. FREEMAN said he had another clause to bring up for the County Council.

The CHAIRMAN: These "surprise" clauses are not very convenient.

Mr. FREEMAN said the clause was as follows:—

The Company shall proceed forthwith to remove, without making any charge, all obstructions or contractions which may have been made or caused by the Company in any pipe for the purpose of reducing the free flow of water to any premises supplied.

He said the matter was one of practical engineering; and it arose in this way: From time to time, in order to check the flow of water passing through the pipes into houses, the Company contracted the mouth of the opening of the pipe; and this ought not to have been done. The Company had recognized that it was an improper action by, in many instances, removing the contraction themselves; and the County Council now, in the interests principally of the occupants of the poorer houses, desired to make it compulsory upon them in all cases to remove those obstructions, so that the actual pipe should convey the flow of water it was obviously intended to do, and the people have a proper supply.

Mr. *Binnie* gave evidence in support of the clause, and stated that, when the Company removed the obstructions, they called upon the householders to pay the cost.

Mr. PEMBER emphatically denied this.

The CHAIRMAN said he thought Mr. Pember's denial should be accepted. He considered it was too small a matter to put into the Bill. He asked if Mr. Freeman had any more "surprise" clauses for the Committee.

Mr. FREEMAN then proposed the insertion of a clause, which he said was copied from the Act of 1884, to the following effect:—

In the event of the purchase of the undertaking of the Company within seven years after the passing of this Act, nothing in this Act contained shall extend, or be deemed or construed to extend, to authorize the Company to bring into account, or to make any claim in respect of, any advantages conferred by, or resulting from, the passing of this Act, except that the purchaser should take over, as a liability, any outstanding debenture stock issued under this Act.

The CHAIRMAN said he thought this matter must necessarily come under the sinking fund clause. The Committee had settled it pretty well in that clause, because they prohibited the 1 per cent. being taken as an item of value on a sale of the works; and they had tied down the capital to a redemption fund. They therefore added nothing to the Bill but what could be redeemed by anybody purchasing within 25 years.

Mr. FREEMAN remarked that the object of the clause was to prevent the profits being swamped.

The CHAIRMAN said the clause was very wide in its scope; and he thought they had provided for all they ought to do.

Other clauses of the Bill were then considered; and the Committee adjourned till the following Monday. On that day, however, a quorum could not be obtained, and a further adjournment was arranged till Tuesday.

Tuesday, June 12.

On the resumption of the proceedings this morning,

Mr. LITTLER, on behalf of West Ham, brought forward a clause making the Water-Rate Definition Act applicable to the Company with respect to their West Ham district, so that the rate should be levied upon the rateable value of the premises instead of upon the gross assessment.

Mr. *W. Eve* was called in support of the clause.

Mr. CRIPPS opposed on behalf of the Company, and urged that it was an amendment of a General Act—a question which it was not desirable that the Committee should decide on the present Bill.

The Committee rejected the clause.

Some further discussion then took place on the sinking fund clause and its application to the premiums upon the capital raised.

Mr. *G. P. Goldney*, the Remembrancer, was called, and explained the operation of the clause; urging that the fact of the premiums being overlooked made a difference of £1900 a year.

Mr. CRIPPS maintained that the clause carried out the decision of the Committee; but he suggested that, for the sake of clearness, the words "rate of" should be added—making the sentence read "above the rate of interest at which such stock was issued, together with an additional 1 per cent. added thereto for management."

The Committee decided to adhere to the clause with the addition suggested.

The Bill was then ordered to be reported, as amended, to the House.

SOUTHWARK AND VAUXHALL WATER BILL.

The Committee then proceeded to deal with the clauses of this Bill; and the sinking fund clauses were inserted, with such formal alterations as rendered it applicable to the Company.

Mr. LITTLER said that, in regard to the rights of the Company to take water from the Thames, the clause had been agreed between the Conservators and the Company; and it would read as follows:—

Nothing in this Act shall repeal, alter, modify, or affect any of the rights, authorities, and privileges of the Conservators of the River Thames now existing or to be conferred upon or vested in them by any Act passed during the present session of Parliament.

The clauses were then agreed to; and the Chairman was directed to report the Bill, as amended, to the House.

The Proposed Purchase of the Water-Works at Mexbro'.—Colonel J. O. Hasted, R.E., held an inquiry at Mexbro' last Tuesday, respecting the Local Board's application to the Local Government Board for authority to borrow £14,000 for water-supply purposes, including the purchase of the Water Company's property. The Clerk to the Local Board (Mr. J. W. Hattersley) explained the steps which had been taken by them, in order to secure an adequate supply of water for the town. The Board were unanimously in favour of becoming possessed of the water-works; and a provisional contract had been entered into with the Company. Mr. J. H. Watson, the Chairman of the Water Committee of the Board, stated that there was unmistakably an ample supply of water in the neighbourhood. The Company had served the town with "moderate satisfaction;" but at times it was thought that the quantity of water supplied was not sufficient—this being due to the inadequacy of the machinery. At the close of the evidence, the Inspector viewed the works.

The Constitution of the Thames Conservancy Board.—The Select Committee of the House of Commons appointed to inquire into the Thames Conservancy Bill proceeded last Tuesday to distribute the 33 seats on the Board as reconstituted. The following is the manner in which the various interests will be represented: Corporation of London, four members; London County Council, four; Trinity House, two; Admiralty, two; Board of Trade, two; shipowners, three; the County Councils of Middlesex, Surrey, Kent, Essex, Oxford, Berks, Bucks, and Herts, one member each; the County Councils of Gloucester and Wilts, one member; the county boroughs of Oxford, Reading, and West Ham, one member each; docks and wharfingers, one member; owners of lightermen and steam-tugs, two members; and the London Water Companies, one member. In the distribution of these seats, the London County Council declined to render any assistance, on the ground that, as the Committee had limited the Board to 33 members, it was not possible for the Council to be adequately represented.

Southport Corporation Gas Department.—Among the minutes presented by the Gas Committee at last Tuesday's meeting of the Southport Town Council were several having for their object the improvement of the general management of the department. They showed that the Borough Treasurer had been requested to devise a scheme of book-keeping both at Crowlands and Eastbank Street; and that a competent clerk is to be sent from the Borough Treasurer's office to the gas office in Eastbank Street, to receive moneys until a permanent appointment was made of a clerk to take the place of Mr. William Booth, who was recently dismissed by the Gas Manager (Mr. J. Booth). Two storekeepers are to be appointed—one for Crowlands and one for Eastbank Street—to check each item coming in and going out. In future all clerks and foremen employed in the Gas Department are to be engaged and discharged by the Committee; and a Sub-Committee, composed of the members of the Committee who are also members of the Finance Committee, are to be appointed to report on the financial arrangements of the gas estate. All orders for coke, fittings, &c., are to be given at the rate office at the Town Hall; and no cash is to be received at Eastbank Street. The Committee also mentioned that a Sub-Committee had been appointed to consider a report prepared by the Manager as to the best system now in use for manufacturing gas.

MISCELLANEOUS NEWS.

THE PROFIT-SHARING SYSTEM IN THE CRYSTAL PALACE DISTRICT GAS COMPANY.

At the close of the letter by Mr. George Livesey, on "The Profit-Sharing System," which appears in our "Correspondence" columns, he mentions that he had forwarded a copy of the rules which have been framed for working the system by the Crystal Palace District Gas Company. We willingly accede to his wish that they may appear in the JOURNAL; and accordingly we give them below. They are preceded in the pass-book by some remarks on the sliding-scale, and its application to the profit-sharing system, which it may not be out of place to reproduce.

By the system of the sliding-scale, established by Act of Parliament, the divisible profits of the Company are made to depend upon the price charged to consumers for gas. For every reduction of 1d. per 1000 cubic feet, the shareholders become entitled to one-eighth per cent. (2s. 6d.) additional dividend; and, on the other hand, should the price of gas be raised, the shareholders' dividend is to be diminished to the extent of one-eighth per cent. (2s. 6d.) for every penny put on the price of gas. It is therefore the duty of the Directors, in the interests of the shareholders, to sell gas at the lowest practicable price. The Act of Parliament does not, however, require the principle of the sliding-scale to be extended or applied to the employees of the Company; consequently they have no special interest in the price at which gas is sold.

In order to remedy this omission, and to offer an encouragement to their officers and workmen, the Directors, on Feb. 9, 1894, resolved to offer to their officers, and to those workmen who were willing to sign an agreement, a share in the profits of the Company, henceforth described as a "bonus," in the form of a percentage on their wages, to be calculated on the principle of the sliding-scale—such percentage to rise when the price of gas is reduced, and to fall when it is raised. The main object the Directors had in view was to induce all their employees to take a real interest in their work, and to give them a new motive for endeavouring to promote the prosperity of the Company. The bonus that for some years was given to the officers of the Company is abolished, and in its place the system herein set forth is in future to apply to officers and workmen alike.

The principle adopted by the Directors is as follows: The starting-point with the sliding-scale in relation to the dividend to the shareholders is fixed by Act of Parliament at 3s. 2d. per 1000 cubic feet, between which price and 2s. 10d. per 1000 cubic feet no additional dividend can be paid to the shareholders; but for every penny reduction below the price of 2s. 10d., the shareholders are entitled to receive 2s. 6d. per cent. additional dividend. For the employees' profit-sharing, the Directors propose to make 3s. per 1000 cubic feet the initial price, or starting-point for the bonus.

When the price of gas charged to the consumer is at or above 3s. per 1000 cubic feet, no bonus shall be given; but for every penny the price shall be reduced below 3s. until the price is reduced to 2s. 6d. per 1000 cubic feet, a bonus, equal in amount to 1 per cent. on the annual amount of salary or wages, shall be paid to each officer and workman; and when the price of gas charged to the consumer is less than 2s. 6d. per 1000 cubic feet, then the further bonus beyond 6 per cent. will be at the rate of ½ per cent. for each penny reduction, and will be paid so long as the Directors are satisfied that it is for the mutual benefit of the Company and its employees. The bonus is illustrated by the following table:—

If the price of gas is	3s.	0d.	per 1000 feet	No bonus.
,,	,,	2	11 ,,	1 per cent.
,,	,,	2	10 ,,	2 ,,
,,	,,	2	9 ,,	3 ,,
,,	,,	2	8 ,,	4 ,,
,,	,,	2	7 ,,	5 ,,
,,	,,	2	6 ,,	6 ,,

And for each penny further reduction, ½ per cent. additional bonus; thus—

If the price of gas is	2s.	5d.	per 1000 feet	6½ per cent.
,,	,,	2	4 ,,	7 ,,
,,	,,	2	3 ,,	7½ ,,

and so on.

The Directors are reluctant to refer to the possible failure of this scheme; but should hereafter this bonus scheme unfortunately not succeed in attaching their employees to the Company's interests, and lead to intelligent and good work on their part, the Board reserves to itself the power to terminate the same on giving not less than six months' notice, to expire on June 30 in any year; and no bonus in addition to ordinary wages will thereafter be given.

RULES.

1. Those employees (and those only) who engage and work under written agreements shall be entitled to the bonus. The Directors reserve the right to refuse permission to sign an agreement to any man who takes no interest in the welfare of the Company, or who is wasteful of the Company's property, or careless or negligent in the performance of his duty.

2. The bonus shall be calculated on the ordinary salary of the officers, and on the daily wages earned by the workmen in the course of the year, which for this purpose shall end on the 30th of June in each year—no account being taken of overtime; and those workmen who may be on piece-work shall have their bonus calculated on the amount they would have earned at their ordinary rate of wages in the regular working hours.

3. No deduction will be made on account of absence caused by sickness, unless the total amount of such absence exceeds two calendar months in the year.

4. The bonus shall not be earned until the 30th of June in each year, or until the agreements for the short terms expire; and no employee or his representatives, shall be entitled to any part of the bonus until the 30th of June, or such term as may be set forth in the agreements for short periods, except in case of death, or leaving the service of the Company.

5. On the declaration of the bonus on the 30th of June in each year, or, in the case of the winter men, on the completion of the times specified in their agreement, the bonus shall become the absolute property of the employee in whose name it is declared, subject to the condition that one-half shall be payable in cash at any time on giving seven days' notice, or it may be left in the Company's hands at 4 per cent. interest; and the other half shall be invested in the Company's 5 per cent. stock in the names of three Trustees, until the amount to the credit of any employee is sufficient to purchase £5 of the stock at the market value, when, unless requested to the contrary, it shall be put in his own name, and a certificate shall be given to him for the amount. Under no circumstances whatever, except fraud, shall the portion of the bonus that may be left in the Company's hands at 4 per cent. interest, or that in the hands of the Trustees, or any accumulations thereof, be forfeited. Winter men, who arrange to return the following winter, will have their bonus on the same terms and conditions as the regular men; but those winter men who do not arrange to return will receive two-thirds bonus, all in cash—nothing being retained in their case. The portions of the bonuses left in the Company's hands on deposit and with the Trustees will be recorded on separate pages in a pass-book, with which each employee will be provided.

6. A Committee of Management shall be elected, to consist of the Chairman of the Board of Directors, and six members elected by the Board, and seven members elected by the profit-sharers, who shall be elected by ballot; four of the members of the Committee to retire by rotation every year—viz., two of the Directors' nominees and two of the workmen's nominees—who shall be eligible for re-election. Eight members shall constitute a quorum; and every resolution to be binding at such meeting shall have for its support a majority of the members of the Committee present at, and voting upon, the resolution. The Chairman of the meeting to have a casting vote in addition to his own vote.

7. The Committee shall appoint a Secretary, who shall have no power of voting.

8. The Committee shall appoint three Trustees, one Director, one officer, and one profit-sharing workman, in whose names the half bonus shall be invested annually, and the dividends as they accrue, in the Company's ordinary stock. A separate account of the principal and of the interest (which will be at the rate of about 5 per cent.), made up once every year, shall be kept for each man; and when the amount standing in any man's name shall be sufficient, either alone or with additions made by himself, to purchase at the market price £5 or more of stock, the Trustees shall, unless requested to the contrary, transfer such amount to him—he paying only the cost of the stamp duty on transfer. In the event of leaving the service of the Company, or winter men not returning the following year, or on the death of any depositor, the Trustees shall pay to him or his representatives, in accordance with Rules 5 and 12, whatever money may be standing in his name in their hands; but under no other circumstances shall any money be withdrawn from the Trustees.

9. Interest at the rate of 4 per cent. per annum will be allowed on all withdrawable amounts left with the Company, excluding fractions of a pound. The said interest shall be calculated up to the 30th of June in each year. No interest shall be allowed for any time less than three months, should the money be withdrawn at an intermediate period.

10. The Company will, in addition to the bonus that may be deposited in their hands by any workman, receive and add to his account any amounts the workman may be able to pay to the Company from his savings or his wages, and on all such sums so received the Company will pay interest at the rate of 4 per cent. per annum, as per Rule 9.

11. The Company will, on the application of any of their employees, make arrangements for the transfer and investment of the money deposited by them, or any other money they may desire to invest, in the stock of the Company, which will yield a dividend equal to about 5 per cent. per annum. Any employee, being a shareholder, can at any time sell his stock at the market price, on application to the Secretary of the Profit-Sharing Committee.

12. Any workman may at any time nominate, in writing, any person as his representative in the event of his death, and, on the receipt of the nomination by the Secretary, such person will thereafter be treated as the legal representative of the said workman; and, on the production of a Registrar's certificate of death, he may withdraw the whole of the money standing to the credit of the deceased workman. But if no nomination has been made, or no provision for legal representation otherwise taken, the money will, on the production of the certificate aforesaid, be paid to the legal representative of the deceased workman. Whenever under this rule, on the decease of an employee, the Company has paid to the person so nominated the amount standing to such deceased employee's credit, such payment shall be valid and effectual against any demand made upon or against the Company by any person whatsoever.

13. In the event of any difference arising as to the construction of these rules, it shall be referred to the Committee, whose decision shall be final and conclusive.

14. There shall be two Auditors—one to be elected by the workmen, the other to be appointed by the Company—whose duty will be to compare and initial the employees' pass-books with the general account, and for that purpose all pass-books must be handed in or sent to the Secretary in the first week of the month of June in each year.

15. The Committee shall meet for the transaction of business when summoned by the Secretary, but not less than twice in each year; or on a requisition of twenty employees or of three of the Committee at any time.

16. The Secretary shall receive all notices, summon all meetings of the Committee, and obey the orders of Committee in all other matters and things whatsoever, and keep the necessary books.

17. No alteration shall be made in these rules except by the sanction of the Committee and of the Board of Directors, and subject to notice of at least one calendar month; which notice shall state the nature of the alterations, and be posted in conspicuous places at the works. But nothing in these rules contained shall give to any employee, whether officer or workman, any right to interfere in the management or control of the Company's works, or in the working and carrying on of the Company's business.

18. The Company shall provide all the books and other incidentals, and keep the accounts, together with a record of all the transactions, at the Company's sole cost and charges.

THE NEW GASHOLDER FOR MIDDLESBROUGH.

The consideration of the question of the tenders for the proposed new gasholder was resumed at the meeting of the Middlesbrough Town Council last Tuesday. The minutes of the Gas Committee contained a large amount of correspondence on the subject; and they concluded with the recommendation that the tender of Messrs. Ashmore, Benson, Pease, and Co. be accepted, subject to a satisfactory contract and guarantee in the terms of the correspondence. The amount of the tender is £14,401.

Alderman HUGH BELL, Chairman of the Gas Committee, in moving the adoption of the minutes, reminded the members that the Committee invited four selected firms to submit tenders for a gasholder, requesting them at the same time to submit their own plans and specifications as to the way they would erect a holder of a certain size. The tenders were referred to a Sub-Committee, who came to the Council with a recommendation that the tender of Messrs. Ashmore, Benson, Pease, and Co. should be accepted. He would incidently remind the Council of the accident which took place in the process of the examination of the tenders, by which the tender of Messrs. Ashmore, Benson, Pease, and Co., originally set at £14,900, was reduced to £14,400. That was explicitly stated by the firm to be the result of a mere clerical error. The lowest tender then was that of Messrs. Ashmore and Co. It was close upon £1000 lower than the next lowest, which was £15,368; but the two tenders were not on the same lines. Messrs. Ashmore and Co. were tendering for a holder, on a plan patented by one of the partners; while the Whessoe Foundry Company, Limited, were tendering for an ordinary form of holder, guided and supported by columns. The former firm also tendered for that class of holder; but their price was £1200 higher than that of the Whessoe Company. On the Sub-Committee considering the matter, they agreed to recommend the acceptance of the tender for the wire-rope guided holder, subject to satisfactory plans and specifications. The firm stated they would guarantee that the holder would do all that they said it would, and that they would give it a substantial form. In addition to this, they would undertake, at their own cost, to place round the holder framing of the ordinary form, if the rope guiding was not found satisfactory. Under these circumstances, he would have no hesitation in placing the order with a firm like that. He had urged it upon the Committee; and he urged it upon the Council. It was carried by the Committee by his casting vote; and he held that the Council ought to adopt it. Adverse opinions had been expressed; and he would have them observe that every one of those opinions came from the Whessoe Foundry Company. What were those opinions? The first purported to be a quotation of the opinion of Mr. George Livesey. He had Mr. Pease's authority to state that Mr. Livesey said he had never given any opinion to the Whessoe Foundry Company at all. The next thing they had was the opinion of Mr. Livesey as quoted by a member of the Gas Committee. But it was no longer Mr. George Livesey, to whose opinion, had they taken it, they might have attached great importance; it was Mr. Frank Livesey, as to whom probably, with the exception of two, no one in the room knew of the existence of such a person. The next thing was a reprint of an opinion alleged to have been given by Mr. George Livesey a couple of years ago. He did not know under what circumstances it was asked, or what importance to attach to it; and he ranked it with all the other opinions that came from the same source as being precisely worth the paper it was written on, and nothing more. These were the opinions which they were asked to set against the deliberate guarantee of people who were the second largest gasholder builders in the world. The Whessoe Foundry Company said that the offer of Messrs. Ashmore and Co. to put in columns for £900 was obviously one which was very silly, because they could not do it for the money. Of course, they could not do it for the money; and they never meant to do it, because they were fully convinced that, if the Council adopted a rope-guided holder, it would remain a rope-guided holder till the crack of doom. In conclusion, Alderman Bell urged that the work was imperative, and asked the Council not to allow any more time to elapse before they made a commencement with it.

Mr. A. MAIN seconded the motion.

Alderman BULMER said he and the Chairman did not agree on this question. He (the speaker) did not think there were better gasholder makers in the world than Messrs. Ashmore, Benson, Pease, and Co.; but he did not like the system they proposed. As to the guarantee, what guarantee would suffice supposing the holder toppled over, "half the town blown away, and half the people killed?" It was perfectly clear, from what had been printed on the minutes, that Mr. Livesey did not recommend the rope-guided holder. They must remember the risk they were running. The holder they were going to erect was 189 feet wide, and 120 feet high; and he therefore held that the difference of £400 odd between Ashmore and Co.'s and the Whessoe Foundry Company's tenders would be well spent in getting a column-guided holder. It was all nonsense to talk about any security that could be given. The only offer Ashmore and Co. had made was, he believed, that they would give 10 per cent. of their contract price. He moved that the minute be referred back to the Committee.

The amendment failed to find a seconder.

Alderman ARCHIBALD moved as a further amendment—"That the recommendation of the Committee be not confirmed." He said that whatever might be thought about the alteration of the tender after the others had been opened, it would have been better if it had never happened. They were now asked to go in for something which had never been adopted on the same scale in the world. They were told that the opinion of Mr. George Livesey, because it was old, was not of very much worth; but if Mr. Livesey had changed his mind, it was not at all likely that Messrs. Ashmore and Co. would not have endeavoured to get an expression of that changed opinion from him.

Mr. M'ARTHUR seconded the amendment.

Alderman JONES, referring to the question of safety, asked the members to take a chimney 200 feet high, with a base of 20 feet, and compare it with a holder 180 feet diameter and 120 feet high. This was equal to a chimney 20 feet diameter at the base, and 15 feet high; and how, he asked, was that going to be blown over?

Alderman TAYLOR said since the opinion which had been quoted was given by Mr. Livesey, he had erected a gasholder, with a diameter of 300 feet, of 12 million cubic feet capacity, the two top lifts of which were rope-guided; and they had withstood the storms of last winter.

Mr. SMITH, who stated that he had been engaged for four years building gasholders, endorsed nearly everything that Alderman Bell had said. But when they visited Tyne Dock, he never saw such a paltry thing as the holder there, and so he had determined to vote against a rope-guided one.

Mr. BENFIELD supported the amendment; remarking that their wisest course would be to adopt something which had been well tried.

The amendment was negatived by 13 votes to 19; and the original motion was adopted.

WIGAN CORPORATION GAS UNDERTAKING.

The Disposition of the Profits.—A Criticism of the Accounts.

At the last Monthly Meeting of the Wigan County Borough Council—the MAYOR (Mr. N. Eckersley) presiding,

Mr. C. B. HOLMES, Chairman of the Gas Committee, moved that the minutes of April 27 and May 16 be adopted and confirmed, except so much thereof as related to the provision of a reserve fund, and that the amount to be handed over in aid of the general district fund be increased to £5000 (see *ante*, p. 919).

Alderman GEE seconded the motion.

Mr. M'QUAID expressed surprise that Mr. Holmes had not made some remarks upon the report of the Gas Engineer. Last year he asked the Chairman what was the reason the profits of the undertaking had decreased; and his reply was that the income from the residuals had materially fallen away. He suggested that in future reports they should have the income from coal carbonized and from the residual products separately stated. He could not say that he looked upon the report as a favourable one; and he had taken trouble to study it very carefully, and to compare it with the report of a neighbouring gas undertaking. The result was that he had come to the conclusion that, in the comparison, Wigan did not appear in a favourable light with regard to the profits realized. He might say that the operations of the neighbouring undertaking were on a larger scale than Wigan, for they carbonized 76,975 tons of coal and cannel, whereas 23,734 tons was the amount in Wigan. He had worked this out, and found that their operations were on a scale of something like one-third of those of the town to which he was referring, because the quantity of gas produced in the neighbouring town amounted to 777,363,000 cubic feet, whereas in Wigan it was 296,171,000 cubic feet. So far they would appear to compare very well; but in the next point Wigan had an advantage in the fact that for every ton of coal carbonized 11,508 cubic feet of gas were made, while in the other town they only obtained 10,098 cubic feet. It was stated in the report of the neighbouring town that they received 7s. 5¾d. per ton of coal carbonized for the residual products. They did not know how much they realized per ton of coal in Wigan; and he hoped to see the information in the next report issued by the Committee. The gross profits of the town referred to amounted to £51,295; and in Wigan, to £18,412. There was not much disproportion there In the distribution of the profits, however, the neighbouring town had certainly a slight advantage over Wigan in her capital charges; for whereas they paid on capital charges £22,280, Wigan paid £9027. But Wigan also paid £4414 into the sinking fund; and they had not heard it explained by the Chairman why such a sum had been paid for the last twelve months, seeing that for the previous year it was only £2700. If the neighbouring town had an advantage on capital charges, he must point out that, on the other hand, they had paid £12,208 for renewal of works and plant; but Wigan had not paid a single penny for that purpose. He now came to the point with regard to the money handed over for the relief of the rates. After paying capital charges of £22,280 and £12,208 for the renewal of plant, the neighbouring town could pay in relief of the rates a trifle short of £17,000, which was nearly three and a half times as much as was paid from the Wigan undertaking for the same purpose. This might not be a very big thing; but it seemed rather strange when they came to consider that Wigan produced 1000 cubic feet of gas per ton more than the town alluded to, where the price for material exceeded that of Wigan to the amount of something like 8d. per ton of coal and cannel. The average price paid by Wigan for the past twelve months was 12s. 7d. and a decimal; but in the neighbouring town the average cost was 13s. 3d. Considering the advantage Wigan had in manufacture, and that the price of gas in the neighbouring town was only 2s. 8d. per 1000 cubic feet, while in Wigan it was 3s. 3d., he regarded the report of the Gas Committee as unsatisfactory. It was but fair to say that the price of gas had only been 3s. 3d. for three months of the year under consideration; but that was a very large item. [Alderman Phillips: The Wigan gas is cheaper with the discount off, taking the old charge.] Mr. M'Quaid said he was speaking of the present price. The other point he wished to direct attention to was an extraordinary one to him. In 1891 the gross profits of the Wigan gas undertaking amounted to £23,297; and in 1893, to £18,412—something like £5000 difference. The extraordinary part was that in 1891 the number of consumers was less by nearly 2000. How

this could be explained, he failed to see. They must look upon the undertaking as a commercial concern. If it was in the hands of a private company, and they had set so much aside for wear and tear and renewal of works, he did not think that £18,000 would pay a fair percentage on the capital invested—viz., £320,000. After being pressed, Mr. M'Quaid said the town he had made the comparison with was Bolton.

Mr. HOLMES, in reply, said there was no reason why their Engineer (Mr. Jos. Timmins) should not give the actual production from residuals; and if it was the desire of the Council, it should be given in the next report. As to the difference in the profits of 1891 and 1893, the winter of 1890-91 was a very foggy and heavy one, trade was remarkably good, and gas was supplied to such an extent that the works were taxed to their utmost limit. Consequently, powers were taken to secure more money to lay down additional retorts; and in the expectation of better times and even greater production, the new works and retorts were constructed. There had not been the necessity to charge them from that time to now; but the Committee knew not how soon they might be required. As to the increase in the sinking fund, the reason was that the money was borrowed for a term of thirty years. The Local Government Board had since decided that the term should be 20 years; consequently they had nearly £1700 a year more to pay on that account. There was the increased interest and the extra cost by the conversion of the stock which they would see amounted to something like £27,000, but which undoubtedly would more than repay itself, and clear a good substantial sum every year towards the profits. Mr. M'Quaid gave the net price of gas in Bolton at 2s. 8d.; but the net price of gas in Wigan was a decimal under 2s. 7d. With reference to the production of Bolton being three times that of Wigan, Mr. M'Quaid must know, as well as anyone else, that the greater amount of gas they could produce now with their staff as it was, the larger the amount of profit there would be per 1000 feet of gas made in addition to the present amount. Besides, the greater amount of gas they could produce, the less would be the cost of manufacture; and consequently the greater would be the profit to the town. He was pleased to see that Mr. M'Quaid had paid the Gas Engineer a compliment, inasmuch as he said that Bolton, under very able management, produced, at a greater price per ton for the coal and cannel carbonized, 10,098 cubic feet; while Wigan, under the management of Mr. Timmins, produced 11,508 feet, or practically one-tenth more than the works Mr. M'Quaid had been crying up. He believed the candle power of the Wigan gas was higher than that of Bolton. He thought, from the reasons he had laid before the members, they would see that the Wigan works were being carried on, not merely equal to the wonderful town alluded to, but were producing and supplying gas at a less cost.

The resolution was passed.

ROCHDALE CORPORATION GAS AND WATER SUPPLY.

Annual Reports and Accounts.

The Gas Committee of the Rochdale Corporation, reporting upon the work of the year ending March 25 last, state that they have again the satisfaction of recording an increase in the quantity of gas consumed, notwithstanding the unfavourable state of trade and the disastrous effects of the coal strike. To ensure an adequate supply of gas to the district during the time the strike lasted caused the Committee no little anxiety, and involved an additional expenditure of above £5000 in the purchase of coal, or, in round figures, an increase of 2s. 6d. per ton on the coal carbonized during the year. Part of this has been covered by the increased receipts from coke and sulphate of ammonia, and part by the advance of 3d. per 1000 cubic feet in the price of gas, which took effect at Christmas last; the net result being a balance of profit of £3809, as compared with £4289 last year. The present condition of the coal trade, the Committee remark, is not such as to favour any reliable estimate as to the prospects of the gas-works for the present year; but the current expenses will be somewhat heavier than last year, quite apart from the cost of coal, as it was deemed advisable during the past year to confine all expenditure within the narrowest possible limits, in view of the probability of all profits being absorbed by the increased expenditure on coal. The rapidly-increasing use of gas for purposes other than lighting is a marked feature in the present year's accounts. The number of stoves on hire has increased from 781 to 1455; and their consumption of gas from 19 to 31 millions. In October next the gas-works will have been fifty years in the possession of the Corporation; and during that period, the profits handed over in aid of the rates have amounted to £267,089, in addition to the gas supplied gratis for public lighting since 1884. The number of consumers at the time the Corporation acquired the works was 904; and the quantity of gas made per annum 27,919,000 cubic feet—the corresponding figures this year being 22,627 consumers, and 392,651,000 cubic feet of gas. The extensions now being carried out at the works are making satisfactory progress; and it is hoped that the new gasholder will be very shortly ready for testing. The amount expended on the works during the year has been £14,455. As to the enrichment of the gas, the Committee state that a considerable quantity of carburine has been used during the year for the purpose of maintaining the illuminating power of the gas, and has proved very beneficial, especially during the strike, when the coal obtainable was of very indifferent quality, and much below the usual supplies.

The Water Committee report that during the year the number of tenants receiving water from the Corporation increased from 24,755 to 25,184; and the receipts showed a total advance of £1021. The additional expenditure for the year was £385; this being due principally to an increase of £244 in the rates and taxes, and to an increase of the charges in the interest account of £110. The net result was that the amount of the deficiency on the revenue account was £635 less than that of the previous year.

The Brighouse Town Council and the Local Gas-Works.—The Brighouse Town Council are making arrangements for the promotion of a Bill in next session of Parliament, to enable them to purchase the undertaking of the Rastrick Gas Company, to carry out a scheme of electric lighting, and for other municipal matters.

NEATH CORPORATION GAS UNDERTAKING.

The Past Year's Working.

The annual report of the Engineer and Manager of the Neath Gas-Works (Mr. R. A. Browning) was laid before the members of the Town Council last Thursday week. With reference to capital, it appeared therefrom that the "A" statement of loan capital showed that out of £57,700 borrowed, £30,946 has been repaid; leaving a balance now due of £26,754. Under the "B" capital statement, £1354 had been expended; leaving a balance of £517 to be carried forward. Most of this expenditure was due to extensions in Tonna, Cadoxton, Aberdulais, Skewen, and within the borough. As to the revenue account, the profit, after deducting all working expenses, bad debts, and allowances amounted to £2441; being an increase of £111. The unfortunate strike of the hauliers and colliers compelled the Committee to pay a much higher price for coal than formerly; and after allowing for increased consumption, the extra cost amounted to £500. If it had not been for this, the profit would have been about £4900, instead of £4400. Mr. Browning proceeded to remark that, having looked on the dark side, he had pleasure in calling attention to the very substantial growth in the receipts. The gas-rental and public lighting showed an increase of about £758; residual products, £196 extra; and profits on fittings and stoves, £45; so that the total receipts amounted to £8930—being an increase of about £1000 upon the corresponding amount last year. Subject to the approval of the Council, the balance of profit and loss had been appropriated as follows: After paying £1079 interest on the different loans and £83 to the bank, £200 had been placed to the depreciation fund account (which now showed a debit balance of £210; and £600 had been placed to the repayment account—leaving a balance of £1591 to be carried to the next account. The quantity of gas produced per ton of coal carbonized was 9820 cubic feet per ton; being a falling off of 190 cubic feet—due to the different kinds of coal used in the manufacture than formerly. The increased consumption of gas amounted to 289,000 cubic feet. Mr. Browning also called attention to the necessity of providing extra storeage room for coal; the present capacity being only about 300 tons. Great inconvenience and loss were suffered last winter through the scarcity of coal occasioned by the strike; and he submitted tenders and plans for a corrugated iron shed, which would store about 500 tons, giving an extra month's supply during the heavy consumption. The report was adopted on the motion of Alderman Rowland, who stated that he looked upon it as a most satisfactory one, considering the difficulties they had had to contend with, especially as to the high price of coal.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday, at the Company's Offices, Southwark Bridge Road S.E.—Mr. C. M. VIALLS in the chair.

The CHAIRMAN, previous to commencing the business before the meeting, said he was extremely sorry to have to inform the shareholders that the Chairman of the Company (Alderman Sir H. E. Knight) was too unwell to be present on that occasion. During the past six weeks, Sir Henry had been very constant in his attendance at the Committees of the two Houses of Parliament; and he was now confined to his bed. It was very unfortunate, because, if he had been well enough to occupy the chair, he could have told them, having been present at the various sittings of the Committees, exactly what was taking place in what was a very serious time for all water companies.

The SECRETARY (Mr. Alfred Jelley) then read the notice convening the meeting.

The CHAIRMAN said the proprietors would remember that in March last the Company submitted to public competition 4 per cent. debentures to the amount of £75,000. These were applied for to the extent of £377,110, and were issued at £130 7s. 8d. per cent.—a satisfactory proof of the high position occupied by the securities of the Company. Out of the £75,000 in question, only £46,232 had been expended up to this time; and therefore it was not at all likely the Directors would have to issue further debentures, at all events for the present. In the revenue account, the charges for maintenance amounted to £42,340, as compared with £41,791 in the six months ending March 31 last year. The increase—some £500—was more than accounted for by the larger sum paid for rates and taxes; these amounting to £11,662, as against £10,519 in the corresponding half year. The shareholders' attention had often been called to the increase in the rates and taxes; and it was desirable to do so, in order to keep before them the constantly growing demands made upon the Company from this source. It was very burdensome; but there was no help for it, and it must be submitted to. Passing to the expenses of management, they amounted to £7026, as compared with £6982 in the corresponding six months of 1892-3. The sums were so nearly alike, that they did not call for any remark. On the other side of the account, the item of water-rents accrued came to £111,345, against £108,316; showing a satisfactory improvement of £3000. They carried to dividend and interest account for transfer of profits £58,663, against £56,560 in March, 1893. After deducting from this sum the interest on the debenture and preference stocks, there remained £32,206 applicable for distribution, out of which the Directors proposed to pay a dividend of 6 per cent. on the ordinary stock and class "D" shares; leaving nearly £1400 to be carried to next year's account, as compared with £746 last half year. This showed the steady prosperity of the Company. It would probably have been noticed that an amount of £171 had been paid to the City Chamberlain. A similar sum was provided in the previous accounts; but it was not paid, owing to a difference of opinion between the Auditors as to the basis of calculation. These sums were to be used by the Chamberlain for the purpose set out in the Act of 1886. They were to form a sinking fund, out of the profits of their undertaking, which was to be used to purchase their share capital; thus, in the place of the present proprietor, substituting in time a foreign element which had taken no part in those periods when the

Company were earning no profits, and, at later times, only small ones. However, Parliament considered it consistent with justice that such a provision should be made; and the Company were compelled to acquiesce in the decision. Turning to the report, the shareholders would observe a reference to the Bill introduced by the Thames Conservators, which was of a very wide and comprehensive character, materially affecting the River Thames as a source of water supply for the Metropolis. The Bill had required the constant attention of the Associated Metropolitan Water Companies; but the Directors considered that the Company's interests were so seriously involved, that it was necessary to appear before the Select Committee in an independent position, as well as in conjunction with the other Companies. The result was satisfactory in this respect—that the position of the Companies with regard to taking water from the Thames would not be interfered with; but all the Companies would have their contributions to the Conservancy Board very considerably augmented. The amount of the extra contribution at first proposed by the Conservators was £12,500. This had now been reduced to £7500; and the share the Company had to provide was £1250 in addition to what they had previously paid—making a total for them of £4550. It was a very large and heavy contribution, considering the small dividend they paid in comparison with the other Water Companies, and the nature of their district. With regard to their own Bill, the proprietors were informed at the Wharncliffe meeting in February of the reasons rendering it necessary for the Company to go to Parliament in order to obtain power to carry out the recommendations of the Royal Commission; and the Bill was then explained to them. They had succeeded so far in obtaining the powers they required; and the works set forth in it would be carried out immediately. The money would be raised by debentures bearing interest at not less than 3½ nor more than 3¾ per cent. per annum, and redeemable in 25 years. The clauses were to be agreed upon that day; and then there remained the third reading of the Bill, which they hoped they would be successful in obtaining. He then moved—"That the report and accounts of the Directors submitted to this meeting be, and the same are, hereby received and adopted."

Mr. H. WHITING seconded the motion.

Mr. JEFFRIES, referring to the item in regard to the allowances for empty houses, said he presumed this was simply an estimate the Board thought it right to allow for; but he should like to know how near to it the actual loss on empties was, and whether the difference between the estimated and the actual amount was shown in the accounts. There appeared to be, so far as he could make out, nothing in the accounts in the shape of interest on their deposits; and he should like an explanation of this. Considering their splendid business and the increase of water-rents during the past half year, he thought the Directors ought to have little difficulty in paying on the next occasion a dividend of 6¼ per cent., and before long 7 per cent.

The CHAIRMAN pointed out that on the debtor side of the account the last item was "Balance carried to next account to provide for losses, £5000." Then on the top of the next column, on the credit side, it would, he said, be seen that they received, in addition to their calculated income, "Surcharges on water-rentals to Sept. 30, 1893, £394." This was in reality money received on discovery of undercharges; and, added to the £5000 brought from the last account, it made about £5394. This was to provide for empty houses, of which, of course, there were a great many. All the houses were charged for, and then those which were empty were provided against by the allowance thus made for empty houses. With regard to interest, no item of that kind appeared in the accounts, because they had had no money on deposit.

Mr. JEFFRIES said there was the balance of £5000 just referred to.

The CHAIRMAN replied that this was employed in the business of the Company. It was not a separate sum that existed, but really a matter of accounts.

Mr. WRIGHT said there was an item of "Deposit account, £9000" in the balance-sheet.

Mr. J. D. A. NORRIS (one of the Auditors) pointed out that during the last half year the circumstances of the Company were different from what they usually were. The Company generally had money on deposit; but in the past six months they required money for paying the parliamentary deposit, and had had to borrow from their bankers. Then, instead of having a credit to No. 4 account, there was a debit interest on temporary loan to the amount of £803. There was, on March 31 last, a deposit of £9000; but it had only been on deposit a few days when the accounts were made up.

The CHAIRMAN, replying to another question, said the provision in the Act of 1886, already referred to, did not apply to the original shares, but to the capital raised since 1886.

The motion was then carried unanimously.

The CHAIRMAN next moved the declaration of dividends at the rate of 5 per cent. per annum on the preference stock, and 6 per cent. per annum on the ordinary stock and class "D" shares.

Mr. H. WHITING seconded the motion, which was carried unanimously.

Mr. JEFFRIES then proposed, and Mr. PHILLIPS seconded, a hearty vote of thanks to the Chairman and Directors; and it was cordially agreed to.

The CHAIRMAN, in acknowledging the compliment, again expressed regret at Sir Henry Knight's absence; and added that, with the help of the Secretary, Engineer, and staff generally, nothing should be wanting on the part of the Board to promote the Company's interests.

The proceedings then terminated.

Explosion at the Wombwell Gas-Works.—Owing to the ignition of an accumulation of gas in the governor-house at the Wombwell Gas-Works on the evening of Sunday, the 10th inst., some damage was done, and the supply of gas to the village was interrupted. It is supposed that the escape took place from an old governor, and was fired by a jet left burning when the pressure was regulated a few hours previously. The yard foreman (Mr. Lisle), who resides on the works, pluckily entered the house, which had been attacked by by the flame, and turned off the gas. No one was injured; and the damage is covered by insurance.

GRAND JUNCTION WATER-WORKS COMPANY.

The Ordinary Half-Yearly General Assembly of this Company was held on Wednesday last, at the Offices, South Molton Street, W.—Mr. FRANCIS TAGART in the chair.

The SECRETARY (Mr. J. Goodwin) having read the notice calling the meeting, the report of the Directors was taken as read.

The CHAIRMAN stated that the accounts for the past half year varied very little—in fact, not at all materially—from those presented at this time last year; and therefore it was unnecessary for him to go through them item by item. The cost of maintenance was high; but this was necessarily so if they were to keep their works up to the mark. Parliamentary and law charges were heavy; but they pretty well cleared up all the expenses connected with the Royal Commission. Rates and taxes were higher; but they were always increasing. On the other hand, the revenue was fairly maintained, although it did not improve to the extent the Directors could desire. The result of the working in the half year was that they were enabled to recommend the same dividend as before—8½ per cent.—which he thought was satisfactory, on the whole. They had sold the covered reservoir at Shoot-up Hill. It was constructed shortly after the passing of the Act of 1871. It was then considered that the Public Authority—which was then the Metropolitan Board of Works—would exercise the power vested in them by that Act, and compel the Company at once to put the whole of their system under constant supply. But they did not do so; and the Company themselves, of their own accord, had introduced the system gradually, until it was now in operation throughout the entire district. Experience having shown that it was more economical and more convenient to pump the water through the main by pressure than to take it by gravitation from a distant reservoir. this covered reservoir had, in point of fact, been of no practical use to the Company of late. What was useless to them, however, had happily been found useful to their neighbours—the West Middlesex Company. It was in the centre of that Company's system; and they had an increasing population all round it. He hoped the bargain which had been entered into between them would be satisfactory, and beneficial to both Companies. The extension of the arrangements for procuring water from the gravel beds at Hampton had been carried out. This was in accordance with the recommendations of Major-General Scott, the Official Water Examiner, and of Dr. Frankland, the eminent Analyst. This water was of exceptional purity; and it enabled the Directors to improve the filtration for the whole of their supply. The two additional filters at Hampton had been completed; and thus the arrangements for the double filtration of the water during times of flood in the river had been carried out. The proprietors would see, from what he had stated, that the Directors had given great attention to the question of filtration. They had had the whole of the filter-beds thoroughly renovated, and new sand spread over them; thus increasing the filtering material, which was so strongly recommended by the Local Government Board. They were gradually replacing their old boilers with others of a more modern type; and these might, perhaps, save them a little in the expenses for fuel. They were bound to do all this work if they accepted their responsibilities and performed their duties; but, unfortunately, it involved considerable outlay. It might shortly be the duty of the Directors to ask the proprietors for their permission to issue the share capital which they were still empowered to raise under their Act; and at the proper time he was sure they would not refuse this request if the Board could satisfy them that the expenditure was necessary for the development and well-being of the Company. The proprietors would remember that the last time he addressed them he stated that the Water Companies had intimated to the Local Government Board that they were then considering a scheme for carrying out the recommendations of the Royal Commission as to increased storeage. This was in November last; and, for his own part, he could have wished, had it been possible, that all the Companies supplying the Metropolis—at any rate, all those drawing water from the Thames—had then been able to introduce into Parliament some General Bill with this object. But at that time it was too late to do anything for the present session. Three Companies had gone to Parliament this session, and would probably obtain their Acts. These Companies, of course, were aware of their immediate necessities, and perhaps best knew their own interests; but the scheme of Messrs. Hunter and Fraser had not been set aside. The Directors were, in fact, now considering how it could be best carried out; they were acting in conjunction with some of the Companies who had Bills before Parliament, but who were not precluded from joining with them. They were now co-operating together in the most friendly spirit, in order to arrive at some understanding; and he hoped that by next November they might be able to give the notice, and promote a Bill. Of course, there were certain difficulties. All the Companies were not in precisely the same position. For his own part, however, he did not see any insurmountable obstacle; and he thought, with the present spirit that was manifested, they would have a Bill before Parliament next year. He considered that this matter was of paramount importance. It was the duty of the Company to their own proprietors, as well as to the ratepayers of London; and he believed it would be equally for the benefit of all the shareholders of all the Companies who were supplying water to the Metropolis. The Thames Conservators still had a Bill before Parliament. By it, in the first instance, they proposed to increase the contributions of the Water Companies by some £12,000, which was now reduced to £7500, of which the Company would have to contribute their proportion. They had sought to obtain some representation on the Thames Conservancy; and he saw by the papers that morning that the Conservators were contented to allow all the Water Companies to have one representative on their body. This was very important, not so much in regard to numbers, but because the views of the Companies, who were so much interested in the matter, should be put before the Conservators. He had only to add that, as prudent men, they saw that the supply of coal at all their pumping-stations was well maintained, and that all their plant and works were in good order and condition. The Board would continue to discharge their duty to the proprietors, as they had hitherto done, to the best of their ability. He concluded by moving—"That

the report of the Directors and the statement of accounts be approved and confirmed; and that the recommendations contained therein be adopted."

The Right Hon. Lord KNUTSFORD, G.C.M.G., seconded the motion.

The CHAIRMAN, in answer to a question, stated that the amount to be received for the Shoot-up Hill reservoir would appear in the next accounts.

The motion was carried unanimously.

Resolutions were afterwards passed declaring the dividends recommended, and re-electing the retiring Directors (Lord Knutsford, Mr. H. Whiting, and the Hon. Sydney Holland) and also the Auditor (Mr. R. A. M'Lean).

The CHAIRMAN, in acknowledging a vote of thanks to the Directors and the officers of the Company, said he quite agreed with a remark which had been made that the consideration of Messrs. Hunter and Fraser's scheme should not be delayed any longer, and that the report of the Royal Commission should be the basis of the Bill next session. He was glad that the officers had been included in the vote, because the Directors were greatly indebted to these gentlemen, by whom they were assisted in every way.

The proceedings then terminated.

BIRMINGHAM CORPORATION WATER SUPPLY.

The Annual Report and Accounts.

At the Meeting of the Birmingham City Council on the 5th inst.—the MAYOR (Alderman Johnson) presiding—the report and accounts of the Water Committee, of which an abstract appeared in the JOURNAL on that day, were presened.

Alderman LAWLEY PARKER, in moving their adoption, alluded first to a proposed revision of water charges in Aston, which, he said, was necessary owing to the reassessment of the parish. The Committee also intended to have a house-to-house inspection of the entire district of supply—the first for eleven years—which would be an extensive work; but it was hoped that the expense would be recouped by the additional rental from the readjustments. Referring to the annual accounts, he remarked that they had received from water-rents £815 more than the amount estimated. This was mainly due to the revised charges producing a greater amount than was calculated. It was estimated when they went to Parliament that the revised charges would produce an increased income of £28,000 a year; while, as a matter of fact, they had produced £32,875, or £4875 more than the calculation. The expenditure side of the accounts was not so satisfactory. The working expenses had exceeded the estimate by £3347; but that was more than explained by the increased cost of pumping. When, however, they obtained the Welsh water, 95 to 97 per cent. would be supplied by gravitation. With reference to the interest and sinking funds on the old loans, a discrepancy had been discovered between the actual payment and the sum that had been estimated for in the tables prepared in relation to the new scheme. He did not know that he could usefully occupy the time of the Council in explaining the matter. It was, however, worth saying that this question of interest and sinking fund on the old loans in no way affected the case of the new scheme. But it did disturb the forecast of future surplus revenue; and unless compensation was found in some other direction, it postponed the date when the Council of the future would be able to take off the reimposed charges. Referring to the expenditure upon the new works, he stated that the contract for 10½ miles of aqueduct, amounting to £284,821, was within 2 per cent. of the Engineer's estimate of the cost—a circumstance which was highly satisfactory. In conclusion, Alderman Parker referred to the proposed visit of the Council to the Elan works, explaining that it was to be a business visit, intended to enable members of the Council to better judge of questions likely to come before them, and that it would be carried out upon the most economical principles.

Mr. FULFORD, commenting upon the accounts, said as to the expenditure of the Committee, while the increase was to be regretted, the Council would have confidence that every penny had been judiciously laid out. The income, however (to the growth of which they had looked to pay the expenses of the Welsh scheme), was not so satisfactory. The income during the past year from water-rents had been £175,916—an increase of £32,733 over that of the previous year. The Committee, in their report, said that this increase arose mainly from the additional rate charged; and the Chairman had just told the Council that the increase from this source was £32,875. It was obvious, however, that the new properties erected in the water area must have produced a considerable revenue; and it seemed to him (Mr. Fulford) that the augmented charge had not yet been felt to any extent in the accounts during the past year. The Committee in 1891 estimated that the future increase of income would be at the rate of 3 per cent. per annum; but he found that the income for the year 1892-3 exceeded that for 1891-2 by £2821, while, according to an estimate he had made, the increase in 1893-4 attributable to new and additional property was £2800. These figures represented an income not of 3 per cent., but of 2 per cent. The Committee had also estimated that by 1900 the yearly income of the department would amount to £213,834; but at the rate of increase of the past two years, it would only be £195,286—a deficit of £18,311. Allowing, however, for interest in respect of diminished profits during the coming seven years, the revenue of the department in 1900 would be short of the estimated amount by at least £25,000. The population in the area of supply he estimated at 600,000; and the revenue from water-rents was £175,000. In 1907 the Committee would have expended about 4 millions; and the total annual charge on the department would be £272,000, or nearly £100,000 a year more than the present income. He was therefore irresistibly led to the conclusion that, as they now had an income of £175,000 from supplying 600,000 people, the population, if they were to obtain an income of £272,000 at the present rates, must increase in fourteen years 60 per cent., or nearly to a million. The Committee estimated the income in 1907 at £258,553, and that there would be a deficiency of income to meet the outgoings of £9329 a year; but if the increase of income from new property only went on at the rate of the last few years (and he saw no reason why it should be more rapid), the deficiency would be more than £50,000 per annum.

Mr. STEMBRIDGE thought the last speaker's criticisms were wide of the mark; and he did not believe any reliable estimate of the probable increase could be formed on the experience of any two years.

Alderman LAWLEY PARKER, in reply, said that Mr. Fulford was wrong in basing his prophecies on the experience of so short a period. The evidence given before the Parliamentary Committee, he thought, would clear up any doubts that members might have as to the finances of the scheme. The Committee had no reason to suppose that there would be a decrease in the population; but they had not assumed that the increase in the future would be at the same rate as in the past.

The motion was adopted.

BRADFORD CORPORATION WATER SUPPLY.

The Finances of the Department.

The Chairman of the Finance Committee of the Bradford Town Council made his annual statement at the meeting of the latter body last Tuesday. In calling attention to the results of the working of the Water Department, he said he was glad to be able to state that, instead of there being a loss on the past year, the income had been equal to all payments, besides leaving a small profit of £200. This result was mainly produced by larger receipts for water both for domestic supply and trade purposes. The amount received was: For domestic supply, £54,908; and by meter for trade purposes, £66,542—making a total of £121,450. This was more than the previous year by £7555, notwithstanding bad trade. He thought the constant increase in the demand for water showed the wisdom of the action which the Council took to secure the Nidd Valley water scheme. In addition to the above income, they had received: For rents of property, £713; consumers' service account, £909; contributions for goit water, £729; interest on premiums made on debenture stock, £512; interest on purchases, £64; interest from the bank, £3912; and sundry other receipts, £269—making £7112, or a total income of £128,562. Having quoted figures showing that the income for water had gradually mounted up from £85,227 in 1883 to £121,450 in the past year, he stated that the following were the payments of the Water Committee for 1893-4 (omitting shillings and pence): Salaries and wages, £6911; rents, rates, and taxes, £9175; general repairs, £2288; repair of meters, £439; repair to farm buildings, £138; expenses at Gilstead filter-beds, £717; Thornton Moor filter-beds, £452; Heaton pumping-station, £429; waste-water department, £1230; coal, coke, and gas, £218; oil and tallow, £109; printing and stationery, £327; compensation for damaged pipe, £3; professional charges, £14; law and parliamentary charges, £1484; interest on loans, £84,263; sinking funds, £18,949; and commission, £65. The various items, with the balance of £200, equalled the total income of £128,562.

ANNUAL INSPECTIONS OF WATER-WORKS BY LOCAL AUTHORITIES.

A Legal Decision as to the Expenses Incurred.

Judgment in an action of some interest to local authorities owning water-works was pronounced a short time since in the Queen's Bench Division of the High Court of Justice, Ireland. The case (the Queen, at the prosecution of Joseph Bridgeman *v.* James W. Drury, Local Government Board Auditor, and the Corporation of Dublin) was argued in the course of last term, before the Lord Chief Justice and Justices O'Brien, Johnson, and Madden, on a motion to make absolute a conditional order for writs of *certiorari* and *mandamus* to remove into Court certain allowances, and to compel the enforcement of certain surcharges made by the Auditor in the accounts of the Dublin Corporation for the year 1892. Among the matters in dispute were: A disallowance of certain sums of £51 10s. 6d. and £3 3s., which were charges made in respect of expenditure for lunch taken by members of the Corporation on the occasion of a visit to the Vartry Water-Works; and an allowance of the sum of £27 in respect of the travelling expenses of members of the Corporation on the same occasion. Regarding the first matter, the Lord Chief Justice, in his judgment (which was concurred in by his colleagues), referred to it as the most interesting matter with which they had to deal; and he asked how it could be maintained. He read from a report by Mr. Drury the circumstances under which it was incurred. Mr. Drury said: "In my last report, I directed attention to the expense incurred in connection with what is called the annual inspection of the Vartry Water-Works; and I intimated my opinion that a portion of it at least was not lawful, and gave the Committee the opportunity of considering their position before again incurring a similar expenditure in 1893. The Committee referred my observations to the Law Agent for report, limiting their inquiry, however, to the point as to the legality of members of the Corporation not being members of the Water-Works Committee being permitted to join the inspection, and have their expenses. Mr. M'Sheehy gave it as his opinion that there is no question of the right of every member of the Corporation, without any permission, to attend any and every inspection of any portion of the corporate property; but 'I am of opinion that it is not legal that his expenses and entertainments while doing so should be paid out of the rates.' In spite of this clear and deliberate opinion from their legal adviser, the Committee appointed a day for the inspection, left the arrangements in the Chairman's hands, directed that the Council should be informed of the date, and arranged the price to be charged to members of the Council for guests. It would be hard to imagine a more deliberate challenge than this." Proceeding, his Lordship referred to the character of the luncheon, which seemed to him to have been a picnic on an extensive scale. There was, he said, no statutable authority for it; and there was no principle of common law by which it was sustainable. The Court agreed with the opinion of the Law Agent of

the Corporation when he expressed himself to the effect that the payment of expenses and entertainment of the general body of the Corporation when inspecting the Vartry works would not be justified. This opinion derived considerable support from the provisions of the 24th and 25th Vic., which enacted that the Council of the Corporation should appoint out of their own body a Committee for carrying into execution the works and purposes of the Act—that was to say, the water-works. Having regard to the duties imposed on this Committee, the Court thought their travelling expenses—that was to say, the travelling expenses of so many of the persons who went to the water-works on the day in question as were members of the Committee, should be allowed. But they could not find any statutable authority, or any decided case, or any principle of law which would justify them in sanctioning the expense of luncheon so far even as it related to them. The Court accordingly thought that a proportion of the travelling expenses should be sanctioned, and that the balance should be disallowed and surcharged. The result of the judgment was that so much of the travelling expenses as related to the members who were out on the excursion or inspection, and who were members of the Water Committee, would be allowed; but the expenditure for the decorations, the luncheon, and the travelling expenses of those who were not members of the Committee, would be disallowed.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The annual meeting of the Perth Gas Commission was held on Monday, when Mr. Wright, the Convener of the Works Committee, presented his statement for the past year. The year, he said, would be looked back upon as signalizing a departure in the manufacture of gas, which was beneficial alike to the Corporation and the consumer. Owing to the manufacture of gas from oil having been introduced in the middle of the year, it was difficult to make a comparison either with previous years or with the estimates adopted twelve months ago. They had sold 88,711,800 cubic feet of gas, which was 592,700 feet less than the estimate. Four large consumers were responsible for a reduction of fully a million cubic feet, owing to their mills having worked short time. Leakage had been reduced from 8 to 7¼ per cent. During last winter, a considerable quantity of tar was used in the manufacture of gas; otherwise the revenue from this source, which was £116 below the estimate, would have exceeded it. Since the accounts were closed they had expended £955, which was at the credit of the contingency fund, in the purchase of £500 of their own annuities. This was the first attempt they had made to redeem annuities. For the current year, they had estimated for the same revenue from gas as was received during the past year; they were to reduce the charge for meters by one-third; and they were to lower the price of gas in Scone from 4s. 7d. to 4s. 2d. per 1000 cubic feet, retaining the price at 3s. 9d. in Perth. With heavy outlays on mains, and the increase of 1s. 6½d. per ton in the price of coal, it would have been absolutely necessary to raise the price of gas if it had not been for the saving which had been effected by the introduction of the oil process, for which they were indebted to Mr. Davidson, the former Convener. Since they took over the gas undertaking 22 years ago, the consumption of gas had more than doubled. In the last ten years, it had increased from 59 to 88 million cubic feet a year. Even admitting that the increased consumption was not to exceed the average, the present works would not be sufficient to guarantee the supply beyond the next four or five years. The report was adopted; and Mr. Wright was thanked for his services.

As showing the view which those who have adopted the Peebles process of oil-gas making have formed of it, it may be stated that the Perth Gas Commissioners, after six months' trial of the system, resolved to commute the royalty which they had agreed to pay to the Oil Gas Enrichment Company, and that they have come to terms with the Company.

This brings me to make another reference to the same system. For the first time since the process was brought out, a partially adverse report has been submitted in regard to it. This occurred at a meeting of the Paisley Gas Corporation on Monday. The report was that of a Committee, who stated that they had visited Peebles, Galashiels, and Perth, and inspected the operations there; and they submitted the comparative costs of making gas from splint coal, splint coal and oil, and splint coal, cannel coal, and shale, the latter as employed in the Paisley works. The report proceeded: "It will thus be seen that the estimated cost of the splint coal and oil mixture exceeds the cost of the present or ordinary gas by fully ¾d. per 1000 cubic feet of gas made (or as 11·96d. to 11·29d.), and which, upon a make of 285 million cubic feet, amounts to £795 12s. 6d. against the oil process. It should be stated, however, that an advance of 2s. 6d. per ton on the shale and coal mixture would reduce this difference, and place the two systems on an equality; and similarly, in the event of 16s. being paid for shale in Paisley, as has been the case in Perth, the oil process would result in a gain of £2149 per annum. In view of the results now arrived at, your Committee are not in a position to recommend the immediate adoption of the process; but they may state that they are very favourably impressed with the excellence and apparent simplicity of the system as in use at the works visited." The report was adopted, the Committee were thanked for their labours, and the subject was sent back to them with power to visit and inspect gas-works where the process is in operation. It is well known that Mr. G. R. Hislop, the Manager of the Paisley Gas-Works, is a gentleman who is full of invention; and his skill in adapting and working plant is so great that he gets results which others cannot. It may be, therefore, that in his case enrichment with oil would not, at present market prices, be profitable; but if that be so, he differs from everybody else who has investigated the subject. Reporting a little over a year ago, Mr. Linton, of Leith, brought out a theoretical difference in favour of oil of 5d. per 1000 cubic feet, taking oil at £2 and coal at 8s. 9d. per ton. I understand that Mr. Yuill, of Alloa, has, in practice, obtained better results than Mr. Linton anticipated. Where it is possible there could be an actual loss, not having the figures of the Paisley Committee, I cannot say; but surely the Committee, in arriving at the conclusion they did, must have forgotten Mr. Hislop's ingenuity in working other plant. It would have been natural if they had concluded that Mr. Hislop, who is so successful with existing plant, would be likely to excel other managers who are working the Peebles process in the results he would get. Did the Committee only take the cost of materials into account? If so, they left out the great saving in the cost of labour and purifying, which would more than turn the balance in favour of oil. The statement that it would require a rise of 2s. 6d. per ton on the price of coal and shale to equalize the two systems, is evidently not well calculated out. With a make of 285 million cubic feet per annum, there would be, supposing 12,000 cubic feet of gas per ton were obtained, about 24,000 tons of coal carbonized; and upon that quantity 2s. 6d. per ton would entail an extra outlay, not of £795, but of £3000. All the rise in the price of coal to equalize would be only about 7½d. per ton. This is an apparent mistake by someone; and if it be taken as a sample of the work done by the Committee, it need be no occasion for surprise that they did not come to the same conclusion as has been done by Committees in other places.

I come now to a very sad circumstance indeed—viz., the suffocation of five women in Glasgow by coal gas. This regrettable affair was discovered last Sunday night, and gave rise to great commotion in the city. The unfortunate women occupied two houses on the ground floor of a tenement of common houses in Little Richard Street, a back street in the Anderston district. They had not been seen since Thursday; and on Sunday night a friend who had called at one of the houses, not getting admission, and knowing that the door had been closed on the previous day, communicated with the police. The officers effected an entrance to first one house and then the other, and found all the occupants lying dead in bed. Suffocation by coal gas, it is agreed, was the cause of death. On Friday, the day after the disappearance of the women, there was such a strong smell of gas in the neighbourhood that a plumber was called in; and he found a leak in the service-pipe, which he repaired. This was at first thought by some to account for the occurrence; but a new cause for it was soon found. It appeared that on the previous Monday workmen had opened the roadway nearly opposite the house, for the purpose of repairing a water-pipe. It is supposed that in the course of this operation a 2-inch disused gas-pipe had been broken, and that the gas escaping from it found its way into the houses. This pipe is said to have been put down about half-a-century ago. It has not been in use since the Corporation took over the gas supply in 1869; and it has all along remained fully charged with gas. Indeed, the supposition is that the existence of the pipe was not known in the gas office. Whether that be so or not, or whether that particular pipe was the cause of the accident, is not quite clear; but the public have decided that it was the cause, and there is a sort of panic over the incident. The city officials do not commit themselves to any theory; but an investigation is to be made into the whole circumstances.

But a more serious question than the existence of disused gas-pipes underground has been raised. A writer in the *Glasgow Herald* on Wednesday, over the initials "F.I.C.," suggested it was the carbon monoxide in the carburetted water gas from the Temple station of the Corporation gas-works which was the cause of the accident. He seemed to understand what he wrote about, for he gave the figures as to the number of deaths which have been caused by water gas in America, as recently quoted by Mr. J. F. Bell, of Stafford, before the Incorporated Institution of Gas Engineers. These figures, he concluded, were not reassuring; and he considered that a grave responsibility rested upon those who increased in any degree, however small, the danger attending the use of illuminating gas. Next day the *Herald* announced that a representative of theirs had called upon Mr. W. Foulis, the Engineer to the Gas Trust. Mr. Foulis said that the statement as to the quantity of water gas which was being manufactured was exaggerated; that the percentage of carbon monoxide was considerably less than the 25 per cent. stated; and that, although there was a percentage of carbon monoxide present, the area supplied was so wide that the effect was practically infinitesimal. Now, of course, Mr. Foulis's opinions are worthy of all respect; and, besides, his knowledge as to what is being done is superior to that of anyone outside. But may there not be a further question? It is only a fortnight ago that I called attention to the curious circumstance that a hotel waiter in Glasgow, in a district not very far from the scene of this lamentable occurrence, had been found dead in bed after two hours' exposure to gas; and I questioned whether the time was sufficient to cause death by the inhalation of coal gas. What is in my mind is that neither gas engineers nor medical men have yet had experience of poisoning by a mixture of coal and water gas. Water gas, we know, is noxious, and coal gas is very much less so; but may not water gas mingled with coal gas make a mixture much more poisonous than the proportions would lead one to expect? This is a subject which would be worth putting to the test.

It is announced to-day that the Watching and Lighting Committee of the Glasgow Corporation have resolved not to proceed with a proposal to extend the system of public lighting by electricity, and that they propose to erect 12 incandescent gas-lamps in St. Vincent Place, as an experiment. It is similarly announced this week that the Rothesay Town Council have abandoned a proposal to light the pier there with electricity, and have resolved to use incandescent gas-lamps instead.

After what I wrote last week regarding the Lockerbie case, I can only express my gratification at the fact that the Police Commissioners have appealed against the decision of Lord Low. There will therefore be an opportunity for a fuller and riper consideration of the law of the case. The pursuers in the action have not acted vindictively. As soon as the decision of Lord Low was received, they met and resolved that they would not ask repayment of the rate which has been collected. They thereby relieved the Police Commissioners of any awkwardness which might have arisen in connection with their finances for the current year. In order to be sure of their ground, the Commissioners convened the ratepayers on Thursday night, and received their support in the proposal to appeal. Before that the Commissioners had, by a majority, resolved to lodge an appeal.

The Dunfermline Town Council about a year ago introduced the

system of waste water inspection by the Deacon waste-water meter; and the result of the working for the year was announced at a meeting last Monday. The consumption of water has been brought down by 208,000 gallons per day, which is equal to a reduction of 9 gallons per head. The consumption for domestic and trade purposes is still over 31 gallons per head, which is quite large enough, and leaves room for a little more reduction. Had means not been taken to check waste, it is calculated that in seven years the water supply would have been exhausted, and an outlay of from £50,000 to £60,000 would have been necessary to augment it. The Council have a burden of £4000 a year for 18 years yet before they will be clear of their present debt; and they are naturally anxious to get as near the end of that period as possible before they require to go in for further outlay in connection with their water-works.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *June* 16.

Sulphate of Ammonia.—A good business was done in the early part of the week; but, towards the close, a quieter feeling set in, brought about by the well-known manœuvres of dealers in want of supplies. The facts previously given as regards the position, stocks, &c., remain unaltered. Only a small quantity of sulphate can come on the market between now and September; and it is therefore difficult to understand why it should be expected that prices should be easier in the meantime, especially in view of the possibility of a protracted strike of Scotch miners. Weak reports emanate from the London market; but there is very little difference in the values offered to and obtained by makers. It is stated that Hull and Liverpool parcels can be bought at £13 17s. 6d.; but the quantities turned over at such figures can only be small. Forward quotations remain unaltered; but buyers meanwhile prefer to look on.

LONDON, *June* 16.

Tar Products.—Benzols continue to change hands at 1s. to 1s. 1d. for 90's, and 1s. 3½d. for 50's. The production for the next few months will, however, be greatly reduced; and with a probable increase in consumption, in the direction of enriching gas, it is scarcely likely that prices will further recede. Solvent naphtha, on the other hand, is becoming much firmer; and as much as 1s. 4½d. per gallon has been secured for early deliveries. Pitch has further improved; and business is reported at 30s. There is considerable inquiry for carbolic acid; but it has not affected the price very much so far. Values may be taken as follows: Tar, 13s. to 18s. Pitch, 30s. Benzols, 90's, 1s. to 1s. 1d.; 50's, 1s. 3½d. Solvent naphtha, 1s. 4d. Creosote, 1¾d. Creosote salts, 20s. Toluol, 1s. 6d. Cresylic acid, 11d. Crude benzol naphtha, 30 per cent., 5d. Carbolic acid, 60's, 1s. 8d. Anthracene, "A," 1s. 2d.; "B," 10½d.

Sulphate of Ammonia has been slightly checked, and may be called 2s. 6d. to 3s. a ton lower on the week; but higher prices are spoken of for forward delivery. Gas liquor is 11s. to 13s. per ton

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Except that the strike of Scotch miners may possibly remove some of the keen competition of coal which has recently been coming into the Lancashire markets from the above districts at excessively low prices, the position in the coal trade remains without any improvement. Prices continue to tend downwards; many of the Lancashire colliery owners being ready sellers at fully 6d. per ton under the figures that were nominally being quoted a week or so back. The pits would seem, if anything, to be getting on to still shorter time—very few of them now running more than three to four days per week. This continued and increasing depression in trade has at length brought about a definite move on the part of the Coal-owners' Federation, for securing a reduction in the present rate of wages. The Conciliation Board has been summoned to meet in London to-day (Tuesday); but the officials of the Miners' Federation have raised a quibbling objection to the terms upon which the application for this meeting was made, and decline to recognize the circulars convening it. It is rumoured that the amount of the reduction to be insisted upon is 10 per cent., to come into force in August; and the only question would seem to be whether the coalowners would be prepared to at the same time admit the principle of a minimum rate of wages. If they will do this, the Miners' Federation would probably raise no serious objection to accepting the reduction. With regard to gas coal contracts, there is still very little business of any weight actually settled; but all indications seem to point to the lessening likelihood of the colliery owners being able to hold out very firmly for any really substantial advance upon the low prices which had to be taken last year. Generally the 1s. advance appears to have been abandoned for an attempt to secure 6d.; but even this seems to be very doubtful, owing to the keenness with which a good many of the contracts are being competed for. The prices obtained for locomotive fuel are about 6d., and for other descriptions for gas making and the general requirements of railway companies about 9d. per ton above last year's rates. The prices I have heard quoted are about 6s. 9d. to 7s. for ordinary locomotive fuel; and about 7s. 3d. for better qualities. In the general trade the position is very much as last reported, except that prices for round coal are easier. Best Wigan Arley is still in isolated cases quoted at 12s.; but 11s. to 11s. 6d. represents the actual full average selling price. Pemberton four-feet and seconds Arley are quoted at 9s. 6d. to 10s.; common housefire qualities, 8s. to 8s. 6d.; and steam and forge coals, 7s. to 7s. 6d. For engine classes of fuel there is a fair amount of inquiry; but the cheap supplies which are being pushed for sale here from other districts tend to weaken the market, and prices are rather easier. Common qualities of slack are being offered as low as 4s. 6d. to 5s., with best at from 6s. to 6s. 6d. per ton.

Northern Coal Trade.—There has been an increased demand for coal during the past few days; and it seems probable that it will be more keenly felt, as there is little doubt now entertained that the Scotch miners will to some extent come out on strike. In expectation of this, large users are now wisely stocking fuel, wherever possible; and work at the collieries is more regular now than is usual in the middle of summer. In consequence, the price of steam coal is higher; but that of gas and household coal is not very materially affected. Best Northumbrian steam coal has been sold at 10s. 6d. per ton f.o.b.; and though there have been sales below this price, it may now be taken as the usual quotation. Second-class steam coals are steady, at about 9s. 6d., and steam smalls are in demand at from 4s. 6d. to 4s. 9d. per ton. In gas coals, there is rather a better supply being taken; and the working at the pits is a little more regular. Best Durham gas coals are quoted from 7s. to 7s. 6d. per ton f.o.b.; and it is believed that one large local contract has just been divided at something like that price. Many contracts will terminate at the end of the month; and in some cases quantities are being freely stocked to enable the lower-priced coal to be fully taken out. Manufacturing coal is quiet. In coke, there is a movement to fix a minimum price for good blast furnace qualities, taking current prices as about the minimum. Coke shipments are rather better than they have been, and may be given as at 13s. to 14s. per ton f.o.b. The output of good gas coke seems to be well taken up; and as shipments are now larger and production is only limited, the stocks are small. There is no alteration in prices; but in view of a scarcity of fuel, sales outside contracts might soon be on a higher level of price.

Scotch Coal Trade.—As is only to be expected, the trade in Scotland is considerably disorganized. There is but another week till it be been whether or not the miners are to come out. The belief gains ground that they will, and that the strike will be general, but short lived. This growing belief is leading consumers to stock coal; and the result is that prices, all over, are up 2s. to 2s. 6d. per ton. While the miners are doing their utmost to organize and be ready to support themselves during the cessation of work, the masters are firm, and have declined to entertain any proposal for a compromise. Arrangements have been made by those who have contracted to get their supplies from the North of England should it be necessary, which points to a spirit of determination which the men will find hard to beat. The men are working very indifferently, with a view to prevent bings being formed. There are no quotations this week, as prices are unreliable. Shipments are heavy, amounting to 163,257 tons—an increase of 21,428 tons upon the previous week, and of 25,191 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,202,433 tons—an increase over the same period last year of 361,139 tons.

Gas-Works Extensions at Sowerby Bridge.—It was announced at the last meeting of the Sowerby Bridge Local Board that the Gas Committee had made an examination of the works, accompanied by a member of the firm of Messrs. Clayton, Son, and Co., Limited, of Leeds, and Mr. John Turner, of Sowerby Bridge. The outcome was that the Committee had resolved that No. 1 holder should be taken down (the material, as far as practicable, to be utilized in carrying out works of extension), and that a third lift should be added to No. 2 holder, which would give extra storeage capacity to the extent of 60,000 feet. A further meeting of the Council will be held shortly, in order to make arrangements for the work being proceeded with.

The Working of the Middleton Corporation Gas Department.—A lengthy comparison was made by Mr. A. Lord, at the last meeting of the Middleton Town Council, of the working of the Gas Department during the past year with that of the preceding twelve months. He said that there had been an appreciable increase in the consumption of gas, and the illuminating power had averaged 18·29 candles, as against 18·27 candles the previous year. The late coal strike had cost an extra £850 for coal and cannel; and the working expenses had gone up £847 during the year. The result of the twelve months' working was a profit of £263. This was a great disappointment to the Committee, for they had hoped to clear at least £1000; and this would probably have been accomplished had it not been for the coal strike. They were looking forward to the coming year in the hope of being able to reduce the price of gas. There was one good feature, and that was that they had not raised the price of gas in consequence of the coal strike, as many other towns had been compelled to do. The Committee recommended the adoption of the Dinsmore process, which would entail a cost of £300; but this, Mr. Lord added, would be recouped the first year.

The Charges for Water at Portsmouth.—This subject was under discussion at the last meeting of the Portsmouth Town Council; the matter having on a previous occasion been referred to the Improvement Committee for inquiry. From their report, it appeared that a Sub-Committee had had an interview with the Directors of the Water Company, who had replied in writing to their representations. (The substance of the reply was given in the JOURNAL last week, p. 1129) Sir William Pink, who originally brought the matter before the Council, did not think the Directors' letter was at all satisfactory; and he moved that it should be referred to the Committee for them to consider how the Company could be made to supply water at more reasonable rates. Mr. H. Pink seconded the motion; remarking that the Company charged the Corporation 6d. per 1000 gallons, while private consumers had to pay 1s. 6d. Alderman Scott Foster said there was a strong feeling in the borough in regard to the excessive charges, and the irritating and vexatious "extras." The Company spoke of the 53 replies that they had received from other towns; but it was a remarkable thing that, of the 53 towns, in 40 cases the water-works belonged to the corporation. This showed that in Portsmouth they had been very remiss. Portsmouth was about the only place having 170,000 inhabitants which had not secured its own water supply. In order to open a way for retaliation, he proposed, as an amendment, that the Roads and Works Committee be instructed to present a scheme for extending to various parts of the borough the supply of salt water for flushing and street-watering purposes. The motion was carried.

Fenton Local Board Gas Supply.—The annual report of the Gas Manager of the Fenton Local Board (Mr. F. H. Darwen) shows that during the twelve months ending Lady-day, there was a decrease in the consumption of gas to the extent of 709,000 cubic feet, and a diminution in the income of £365. This latter falling off is the result of the reduction in the price of gas of 3d. per 1000 cubic feet at Michaelmas; and the decrease in the consumption of gas is attributed to the bad trade in the district. There were 390 penny-in-the-slot meters fixed; and the income from these was £426, as against £28 in the previous year. The gross profit was £3031. The interest on loans for the year amounted to £2125; and the instalment on capital to £515—leaving a net profit of £391.

The Manchester Corporation Coal and Cannel Contracts.—In reply to their recent advertisements for supplies of coal and cannel for the coming year, the Gas Committee of the Manchester Corporation received in all 136 tenders, together with 248 samples; representing a grand total of some 4,000,000 tons. The Committee met on Friday, and accepted tenders to the extent of 300,000 tons. It was expected that prices would be rather higher than those of last year; but a Manchester correspondent informs us that the cannel has been obtained at lower figures than those of twelve months ago, and the coal at about the same rate. The supplies are to be received from about thirty firms; and they are to be drawn chiefly from Wigan, West Yorkshire, and Nottinghamshire.

The St. Pancras Electric Lighting Scheme.—At the meeting of the St. Pancras Vestry last Wednesday, the Chairman of the Electricity Committee (Mr. A. Sweet) presented his annual report. He described the past year's business as satisfactory. The total income was £15,022, which was sufficient to clear off the deficit of the first year—£1543—and, after paying all the working expenses, and spending £927 in maintaining the plant in the highest state of efficiency, leave a balance of £4669, out of which interest and the repayment of loans had been met. The ratio of cost for public lighting for the year by electricity, as compared with gas, was high. But the charge of 6d. per unit was certainly less than a company would make under similar conditions; and from Michaelmas next it would be reduced to 5d. The supply of electricity to private houses, though not large, was promising, as the number of consumers had doubled during the past year. The report was adopted; and the Chairman was thanked for his services.

Stealing Gas at Burnley.—At the Burnley Police Court last Wednesday, a painter's warehouseman, named William Hood, was charged with fraudulently abstracting gas from the pipes of the Corporation. The defendant lived at a house in Lisbon Street, Burnley, which at one time was divided into two tenements, and had two separate services of gas—one at the back and the other at the front. Some time ago, the two tenements were connected and the meter in the back part removed; but the fittings had been connected, with the result that defendant obtained the use of gas in the back portion of the premises without its passing through the meter. Last year the neighbours observed that the defendant was using gas in the fire-place at the back; and since then the same thing had been noticed frequently. Information was given to the Corporation; and an investigation showed that the defendant had connected the old service-pipe by a brass tube, which he covered with cloth and white lead. There was also an india-rubber tube connected with the fireplace. Defendant, who had nothing to say, was fined £4 and costs, and ordered to pay £1 as damage; in default, one month's imprisonment.

Great Western Railway Mechanics' Institution.—The Junior Engineering Society in connection with this Institution opened another year last Thursday evening by visiting the Great Western Railway Company's gas-works at New Swindon, of which the Vice-President (Mr. E. C. Riley) is the Manager. On the arrival of the members, Mr. Riley delivered an instructive address, in which he traced the treatment of the raw materials—coal and oil—used in the production of the two kinds of gas employed by the Company for the lighting of their works and carriages respectively; concluding with a brief review of the recent progress of gas making. With the assistance of his foreman (Mr. Faulkner), the party were then conducted by Mr. Riley round the works—following the course taken in the address. An interesting feature of the oil-gas plant was the use of the tarry residuals for the generation of steam. The visit terminated with the inspection of specimens of gas-producing coals and their bye-products, an automatic meter, and an arrangement by Mr. Faulkner of several types of burners and lamps to demonstrate the improvements which have been effected in this direction. Before dispersing, the visitors expressed their great indebtedness to Mr. Riley and Mr. Faulkner for their courtesy, by according them a very hearty vote of thanks.

Exhibitions of Gas Appliances.—In the Rathmines Town Hall, from the 21st ult. to the 1st inst., Messrs. Richmond and Co., Limited, held a very successful exhibition of their gas appliances. The arrangements, which were carried out by their Manager (Mr. H. E. Ransome), included cookery lectures by Miss Owen.——At an industrial and trades exhibition recently held in Salisbury, Messrs. John Wright and Co., Limited, showed gas cooking and heating stoves; and Mrs. J. B. Thwaites gave practical demonstrations in cookery with the aid of their "Eureka" oven. The lighting of the exhibition was carried out by a local firm by means of Welsbach incandescent gas-lights.——From the 5th to the 8th inst., the Davis Gas-Stove Company, Limited, held an exhibition in the Shanklin Institute, with Mrs. Hunter's co-operation as lecturer. On the opening day, Mr. G. Garnett, Chairman of the Shanklin Gas Company, delivered an address. A similar exhibition was held by them last week at the Oddfellows' Hall, Sandown, with the same lady's assistance.——Messrs. W. Parkinson and Co. held very successful gas exhibitions last week in the Temperance Hall, Bromyard, and in the Swan Hotel Assembly Rooms, Moreton-in-Marsh. Miss Edith Sanderson gave practical demonstrations in cookery twice daily at both places to large audiences. This week they will be holding exhibitions in the Town Hall, Chipping Norton, and in the Masonic Hall, Stow-on-the-Wold. Miss Sanderson will lecture at each place. They will also have an exhibition this week in the Town Hall, Stone (Staffs.), in conjunction with Messrs. John Wright and Co.; cookery demonstrations being given twice each day by Miss S. Thwaites.

The Bolton Corporation Electric Lighting Scheme.—The Bolton Corporation electric lighting works are rapidly approaching completion; and, with the view of inducing a larger number of the tradesmen and others to avail themselves of the new illuminant, the Committee have agreed upon a system of allowing persons to have fittings for a supply on the hire-purchase system, or what may be called the deferred-payment system. One-eighth of the amount due is to be chargeable on the completion of the work; and the remaining seven-eighths will be payable by equal quarterly instalments.

Water Supply in India.—The new water-works at Arrah, Behar, have lately been opened by his Honour the Lieut.-Governor of Bengal. They are calculated to supply 280,000 gallons of water daily—sufficient for the consumption of 40,000 persons, or 7 gallons per head per diem. The capital expenditure has been only Rs. 4,00,000, or Rs. 10 per head of the population. The water is taken from the River Sone; and, after passing the settling-tanks and filter-beds, is pumped through a 13-inch main 5¼ miles long to an elevated reservoir, from which it is distributed to the stand-posts in the town. The pumping-engines and boilers were made by Tangyes Limited; and the whole contract has been carried out by Messrs. Martin and Co., of Calcutta.

Gas and Electric Lighting in the City of London.—The new Engineer and Surveyor to the Commissioners of Sewers (Mr. D. J. Ross), in the course of his report on the works executed by the Commissioners during 1893, states that at the end of the year the number of gas-lamps unlit was 1315, while the number of arc lamps was 479. For each arc lamp lighted, about 2·74 gas-lamps were extinguished. The question of introducing the incandescent system of electric lighting in some of the minor streets was brought up last year; and it was still under the consideration of the Commissioners when the report was prepared. Reference is made to the failures of the lighting, in regard to which a special report, dealing with the six months ending Oct. 31 last, was presented in November. Mr. Ross states that the majority of them were not in groups, or for long periods; the extinctions representing only 0·046 of the total time of burning, or one hour in 2100 hours.

The Price of Gas North of the Thames.—At a meeting of the executive of the Gas Consumers' Protection League, presided over by Mr. James Rowlands, M.P., the following resolution was unanimously adopted: "That this meeting expresses its indignation at the proposed insignificant reduction by The Gaslight and Coke Company of 1d. per 1000 cubic feet to their consumers north of the Thames, while still maintaining the difference of 8d. per 1000 cubic feet between their clients north and south of the Thames; and this meeting further expresses its indignation at the action of the above Company in increasing the price of gas 2d. per 1000 cubic feet to the ratepayers for the public lighting of the thoroughfares within the area which they supply. That this League intends to persevere with the agitation, and to press upon the Government the necessity of appointing a Select Committee to inquire into the whole question of the gas supply of the Metropolis."

Sales of Stock and Shares.—Messrs. Parsons and Robjent sold, at Newport (Mon.) last week, £6000 of "C" 7 per cent. stock in the *Newport Gas Company*. The prices realized ranged from £135 to £136 15s. per cent. About £8100 was realized by the sale.——On Thursday, a number of gas and water shares were sold at Whitby. The first lots consisted of 52 fully-paid shares of £10 each in the *Whitby Water Company*; and they fetched from £19 10s. to £19 17s. 6d. per share. Fifty-five shares of £10 each (£9 paid) in the *Pickering Gas and Water Company, Limited*, were then offered, and realized from £10 2s. 6d. to £10 7s. 6d. per share. Ten fully-paid original shares of £10 each in the *Whitby Gas Company* were sold at £21 17s. 6d. each. One hundred fully-paid shares of £1 each in the *Kirbymoorside Gas and Water Company, Limited*, were disposed of at 9s. 6d. per share.——The *Harrogate Gas Company* have lately offered for sale by tender 500 shares of £10 each; the minimum price being fixed at £24 10s. Last Friday, the Directors opened the tenders, which were for 713 (only 500 being on offer); and the 500 allotted realized £12,740 5s.; or an average of £25 9s. 7d.—being 19s. 7d. over the minimum fixed.

Lincoln Corporation Water-Works.—In moving the adoption of the proceedings of the Water Committee at the meeting of the Lincoln City Council, on the 5th inst., Alderman Maltby said it appeared from a statement which had been drawn up by their Engineer (Mr. H. Teague) that the purchase-money paid 24 years ago for the undertaking was £63,827; that the expenditure since amounted to £41,150; and that there had been advanced from revenue £3299—making a total capital of £108,277. The number of houses supplied with water on March 25, 1894, was 10,074—an increase for the year of 237. The quantity of water pumped during the year was 420,795,360 gallons—a decrease on the year of 24,549,687 gallons. Since 1871—the last year the Water Company had possession—the capacity of the impounding reservoirs had been increased by 125 per cent.; the filtering area by 82 per cent.; the pumping power by 112 per cent.; and the service reservoirs by 212 per cent. The mains had been increased from 21 miles to 45 miles, or by about 114 per cent. As to the water supplied in 1871, the quantity pumped was 147,736,000 gallons; and in 1894, 420,795,360 gallons—an increase equal to 185 per cent. The consumption per head per day (including trade purposes) was, in 1871, 14·2 gallons; and in 1894, 21·76 gallons. The number of houses supplied in 1871 was 4570, against 10,074 in 1894—an increase of 142 per cent. The income in 1871 was £4559; and last year it was £9464. This amount was £1700 less than it would have been had the charge been on the rental instead of on the rateable value. The expenditure in 1871 was £1792; and in 1894, after deducting the amounts advanced on capital, hydrants, renewals, and excess for coal owing to the strike, it was £3054—an increase of 71 per cent. The amounts paid out of revenue since 1877 were: Renewals of iron mains, £1468; hydrants (before 1877, £464; since, £254), £718; paid to the district rate, £500; advanced to capital, £3299—total, £5986. There had also been paid in reduction of the purchase account, on principal, £17,610; and on interest, £73,651—a total of £91,261. When they took into consideration the reduction in charges which had been made since the undertaking became the property of the Corporation, he thought this state of affairs very satisfactory indeed. The minutes were adopted.

The Whessoe Foundry Company, Limited, have been entrusted with the contract, for which they tendered, for six large annular condensers, &c., for the Stockton Corporation Gas-Works. In addition to the large gasholder now in hand for Montreal, the Company's tenders have been accepted for holders at Birtley, Barnard Castle, and Easingwold. Other contracts upon which they are busy include purifiers for Darlington and Ottawa, and exhausters for Montreal.

Completion of the Lurgan Water-Works.—The water-works for Lurgan, which have been in course of construction for some years, have now been completed, and were formally opened by Mrs. Malcolm, the wife of the Chairman of the Town Commissioners, last Tuesday. The water is drawn from Lough Neagh; and the scheme (which was projected by Mr. W. B. Bryan, Engineer of the East London Water Company), has involved the laying of 12½ miles of pipes. The cost of the works has been about £28,000.

The Management of the Rotherham Corporation Water-Works.—At a recent meeting of the Rotherham Town Council, the members were engaged a full hour discussing a suggestion by the Chairman of the Water Committee (Mr. W. L. B. Hirst, J.P.) with reference to the appointment of an independent Manager for the works, which at present are under the control of the Gas Engineer (Mr. C. B. Newton). In support of his proposal, Mr. Hirst declared that if the Council would allow him to have a separate Manager for the works, he would then make a profit on them; and he denied that he was animated by any animosity against Mr. Newton. The proposition was rejected.

Additions to the Worcester Water-Works.—Some years ago the Worcester City Council resolved to extend the Barbourne Water-Works for the better filtration of the water; and later on they decided that, in order to supply houses at certain high levels, a reservoir should be built at Elbury Hill. The former work has been nearly completed; while the latter is being rapidly constructed. At Barbourne three new filtering-beds are being added, which will allow of filtration at a slower rate, and with a better result. The new filters cover a large area; and the recent extensions have absorbed practically the whole of the site at Barbourne. The reservoir at Elbury Hill is of rectangular shape, with strong walls backed by puddle. It is at a height of 270 feet from the river, or 300 feet above sea-level; and the water and building materials are drawn up by machinery. Later on the water will be pumped from Barbourne to the reservoir by electic engines.

An Electric Lighting Scheme for Colchester.—Eight years ago Mr. W. H. Massey reported that electric lighting could not be carried on in Colchester at a profit by a Company; and he is still of that opinion. But he now thinks that an installation might, in the hands of the Corporation, be financially successful. Chief among his reasons for this are that they are in a position to borrow money cheaply; nothing would have to be paid for promotion; salaries would be to some extent saved; and the works could be run in conjunction with some other Corporation department. With regard to the cost, he says that, to provide only for the lighting of the compulsory area specified in the Corporation Provisional Order by arc lamps, and for the supply of current to about 3000 40 watt glow lamps out of a total of 4000 or 5000 fixed in the houses and shops in these streets, an expenditure of nearly £13,000 would have to be incurred. He is, however, quite sure that, if the scheme is limited to this area, there will be difficulty in making the electric light pay its way, even in the hands of the Corporation; and he suggests that the district should be extended so as to embrace an area in which it is reasonable to suppose 6000 or 7000 lamps would be fixed in houses and shops, the estimated total expenditure for which would be about £18,000. To this, he says, it would be wise to add £2000 as working capital; so that a loan of (say) £20,000 would be required. The Lighting Committee are to circularize the occupiers of premises situated in the large area mentioned by Mr. Massey.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 1170.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	12 Apl.	10½	Alliance & Dublin 10 p. c.	10	17½—18½	..	5 13 6
100,000	10	,,	7½	Do. 7 p.c	10	12—13	..	5 15 4
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	107—109	..	4 11 9
100,000	20	14 June	8	Bahia, Limited	20	9½—10¾*	..	5 3 10
200,000	5	11 May	6½	Bombay, Limited	5	5¼—5⅝	+⅛	5 13 0
40,000	5	,,	6½	Do. New	4	4—4½	..	5 15 6
380,000	Stck.	28 Feb.	11½	Brentford Consolidated	100	223—228	+6	5 0 10
180,000	,,	,,	8½	Do. New	100	168—173	+1	4 18 3
220,000	Stck.	15 Mar.	11½	Brighton & Hove Original	100	210—215	..	5 6 11
888,500	Stck.	28 Feb.	5	Bristol	100	109—112	..	4 9 3
320,000	20	29 Mar.	11½	British	20	45—47	..	4 15 10
50,000	10	28 Feb.	11½	Bromley, Ordinary 10 p. c.	10	21—22	..	5 4 7
51,510	10	,,	8½	Do. 7 p. c.	10	16—17	..	5 0 0
328,750	10	28 July	2	Buenos Ayres (New) Limited	10	5—6	..	3 6 8
200,000	100	2 Jan.	6	Cagliari, Limited	20	26—27	..	5 18 6
550,000	Stck.	12 Apl.	12½	Commercial, Old Stock	100	253—258	..	4 18 6
165,000	,,	,,	9½	Do. New do.	100	190—195	..	4 17 5
160,762	,,	14 June	4½	Do. 4½ p. c. Deb. do.	100	130—135*	+½	3 6 8
800,000	Stck.	14 June	13	Continental Union Limited	100	235—240*	+2½	5 8 4
200,000	,,	,,	10	Do. 7 p. c. Pref	100	205—210*	+1½	4 15 3
535,000	Stck.	28 Feb.	5	Crystal Palace Ord. 5 p.c. Stk	100	105—110	..	4 10 11
486,090	10	31 Jan.	11†	European, Limited	10	23—24	+1	4 11 8
354,060	10	,,	11†	Do. Partly paid	7½	16—17	+½	4 17 1
5,646,590	Stck.	14 Feb.	12	Gaslight & Coke, A, Ordinary	100	231—236	+1	5 1 6
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—104	..	3 16 11
665 000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	275—280	..	3 12 5
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	130—135	..	3 14 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	193—195	..	3 16 11
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	177—182	..	3 16 11
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	272—277	..	3 12 3
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	100	165—170	..	3 10 7
1,061,150	,,	4 June	4	Do. 4 p. c. Deb. Stk.	100	127-130*	+1	3 1 6
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	130—135*	+½	3 6 8
908,000	,,	,,	6	Do. 6 p. c. do	100	175—180*	+1	3 6 8
3,800,000	Stck.	11 May	12	Imperial Continental	100	213—218	..	5 10 1
75,000	5	14 June	6	Malta & Mediterranean, Ltd.	5	4⅛—5*	+⅛	6 0 0
560,000	100	2 Apl.	5	Met. of Melbourne, 5p. c. Deb.	100	109—111	..	4 10 1
541,920	20	14 June	5	Monte Video, Limited	20	13⅛—14⅛*	..	6 18 0
150,000	5	30 May	8	Oriental, Limited	5	5⅞—6⅛	..	6 8 0
60,000	5	29 Mar.	7	Ottoman, Limited	5	3⅞—4⅛	..	7 7 4
166,870	10	31 Jan.	2	Pará Limited	10	1½—2	..	10 0 0
420,000	100	2 May	6	People's Gas of Chicago—1st Mtg. Bds.	100	102—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	95—100	..	6 0 0
150,000	10	26 Apl.	6	San Paulo, Limited	10	9⅛—10⅛	..	5 14 3
500,000	Stck.	28 Feb.	15½	South Metropolitan, A Stock	100	317—322	..	3 16 3
1,350,000	,,	,,	12	Do. B do.	100	265—267	+3½	4 9 11
260,000	,,	,,	13	Do. C do.	100	267—272	+2	4 15 7
750,000	,,	17 Jan.	5	Do. 5 p. c. Deb. Stk.	100	153—157	..	3 3 8
60,000	Stck.	28 Feb.	11½	Tottenham & Edm'nton, "A"	100	210—215	..	5 7 0
				WATER COMPANIES.				
745,967	Stck.	29 Dec.	10	Chelsea, Ordinary	100	277—282	..	3 10 11
1,720,252	Stck.	12 Apl.	8	East London, Ordinary	100	225—230	+2	3 9 7
544,440	,,	29 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	147—150	..	3 0 0
700,000	50	14 June	8½	Grand Junction	50	116—120*	+3½	3 13 10
708,000	Stck.	28 Feb.	11½	Kent	100	293—298	+3	3 17 2
1,043,800	100	29 Dec.	9½	Lambeth, 10 p. c. max.	100	257—262	+2	3 12 7
200,000	100	,,	7½	Do. 7½ p. c. max.	100	205—210	+1½	3 11 5
330,000	Stck.	29 Mar.	4	Do. 4 p. c. Deb. Stk.	100	132—135	..	2 19 3
500,000	100	14 Feb.	12½	New River, New Shares	100	367—372	..	3 5 2
1,030,000	Stck.	31 Jan.	4	Do. 4 p. c. Deb. Stk	100	134—137	..	2 18 4
902,300	Stck.	14 June	6	S'thwk & V'xhall, 10p. c. max.	100	163—168*	+5	3 11 5
126,500	100	,,	6	Do. D 7½ p. c. do.	100	147—150*	+2	4 0 0
1,155,066	Stck.	14 June	10	West Middlesex	100	267—272*	+2	3 13 7

*Ex div.

† Next dividend will be at this rate.

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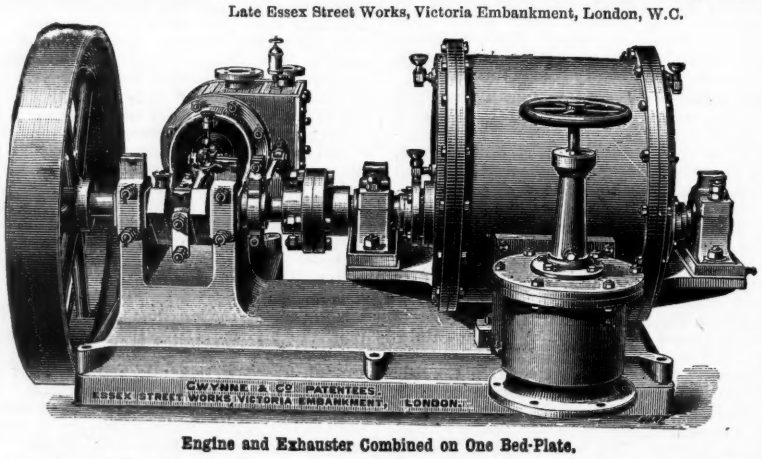
Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



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Telegrams: "HUTCHINSON BROS., BARNSLEY."

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*** See Advertisement p. II., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

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Applications, stating age and experience, with reference as to character and last employment, to be addressed to
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R. G. HINNELL,
Town Clerk.
May 22, 1894.

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HYDRATED OXIDE OF IRON.

PREPARED from pure Iron
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
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SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759
GAS PLANT CEMENT
FOR ALL LEAKAGES.

TENDERS FOR GAS COAL.

THE Directors of the Westerham Gas and Coke Company, Limited, invite TENDERS for a Year's supply of about 450 tons of the best screened GAS COALS, delivered at Westerham Station, in quantities of about 50 tons to suit the convenience of the Directors.
Tenders, stating the description, and endorsed "Tender for Coals," to be sent to the Office of the Company on or before Wednesday, the 4th of July.
The Directors do not bind themselves to accept the lowest or any tender.
By order,
CHARLES HOOKER,
Secretary and Manager.
Westerham, Kent.

BOROUGH OF BATLEY.

TENDERS FOR GAS COAL.

THE Corporation of Batley are prepared to receive TENDERS for the supply and delivery at their Gas-Works of 10,000 tons of GAS COAL.
Conditions and Forms of Tender may be obtained on application to the Manager at the Gas-Works.
Sealed tenders, addressed to me and endorsed "Gas Coal," to be delivered at my Office by Noon on Monday, the 2nd day of July prox.
The Corporation do not bind themselves to accept the lowest or any tender, and may accept any tender for a part only of the specified quantity.
Jos. HANSON CRAIK,
Town Clerk.
Town Clerk's Office, Batley,
June 15, 1894.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation are prepared to receive TENDERS for the purchase of RETORT CARBON (about 50 tons) produced at their Gas-Works during the Year ending the 30th of June, 1895.
Delivery to take place from the Railway Siding of the Corporation Gas-Works.
Further Information may be obtained from Mr. Thomas Holgate, F.C.S., Gas-Works, Halifax.
Sealed tenders, endorsed "Carbon," stating the price offered per ton, to be sent to the undersigned, not later than Ten a.m., on Friday, the 22nd of June, 1894.
The highest or any tender will not necessarily be accepted.
By order,
KEIGHLEY WALTON,
Town Clerk.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation are prepared to receive TENDERS for the supply of 35,000 tons of GAS COAL, and 5000 tons of CANNEL COAL, to be supplied in such quantities as may from time to time be determined by the Gas-Works Committee during the Year ending the 31st day of July, 1895.
Forms of Tender and further Information may be obtained on application to Mr. Thomas Holgate, Manager, Gas-Works, Halifax.
Tenders, endorsed "Tender for Coal," must be sent to me before Ten a.m. on Friday, the 22nd of June, 1894.
The tender of any person paying less than the minimum standard rate of wages, and who does not observe the hours and conditions of labour generally recognized in the district, will not be accepted. This condition shall be construed to the acts of Sub-Contractors, where such may exist.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
KEIGHLEY WALTON,
Town Clerk.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of 2000 tons and upwards (20 cwt. to the ton) of GAS COAL, to be delivered in quantities as required to Brettell Lane Station or Round Oak Siding, G.W.R., by the 30th of June, 1895.

The Board do not bind themselves to accept the lowest or any tender.

Tenders to be addressed to the Chairman not later than the 30th of June next, and endorsed "Tender for Gas Coal."

No tender forms are issued.

HENRY M. JACKSON,
Secretary.

Board-Room, Gas-Works, Brierley Hill,
June 11, 1894.

BRIERLEY HILL DISTRICT GASLIGHT COMPANY.

TENDERS FOR TAR.

THE Directors of the above Company invite TENDERS for the purchase of their surplus TAR made at their Brierley Hill and Kingswinford Works for a period of One Year, from the 1st of July next.

Sealed tenders, endorsed "Tar," to be addressed to the Chairman of the Company by the 30th inst.

The Directors do not bind themselves to accept the highest or any tender.

Further Particulars may be had of the undersigned.

HENRY M. JACKSON,
Secretary.

Gas-Works, Brierley Hill,
June 11, 1894.

COUNTY BOROUGH OF STOCKPORT.

(GAS DEPARTMENT.)

TO IRONFOUNDERS, ETC.

THE Gas Committee are prepared to receive TENDERS for the supply of about 2000 yards of 3-inch CAST-IRON MAINS (weight per yard not to exceed 34 lbs.); 1000 yards of 4-inch CAST-IRON MAINS (weight per yard not to exceed 46 lbs.); and IRREGULARS for both sizes, all delivered at Stockport.

Tenders, endorsed "Mains," and addressed to the Chairman of the Gas Committee, Stockport, to be sent in on or before Wednesday night, June 20, 1894.

Forms of Tender and any further Information can be obtained on application to the Engineer, S. Meunier, Millgate Gas-Works, Stockport.

No tender will be accepted without satisfactory proof that the firm tendering pays the standard rate of wages, and observes the standard number of hours.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
WALTER HYDE,
Town Clerk.

Stockport, June 11, 1894.

BOROUGH OF BEVERLEY.

TENDERS FOR COAL.

THE Gas Committee are desirous to receive TENDERS for the supply of COAL, for periods of Six and Twelve Months respectively, from the 1st of August next; to be delivered as from time to time directed by, and at the expense of, the Contractors, f.o.b. at Keadby, or at the Pits, or at the Railway Station, Beverley, according to the Terms of Contract.

The Coal to be of the best kind, well screened, free from Sulphur, Bats, Bind, Refuse, and Dirt, and to be weighed (20 cwt. to the ton) upon the Corporation Machine.

Payments will be made monthly, so long as the Contract shall be duly fulfilled.

The Corporation do not bind themselves to accept the lowest or any tender.

Further Information may be obtained of the Gas Manager, Mr. James Gibson, at the Gas-Works, Beverley; and tenders, endorsed "Tender for Coal," must be delivered at my Office not later than Ten a.m., on Thursday, the 28th inst.

By order,
JAMES MILLS,
Town Clerk.

Guildhall, Beverley,
June 11, 1894.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

GENERAL STORES.

THE Corporation are prepared to receive TENDERS for the following MATERIALS, in such quantities as may be required, during the Twelve Months following the acceptance of tenders, viz.—

1. Iron.
2. Tin Sheets Galvanized
3. Lead Pipe, Block Tin, Tubing, &c.
4. Bolts, Nuts, Rivets, &c.
5. Iron Castings, Cast-Iron Pipes, Irregulars, &c.
6. Brass Meter Taps and Keys.
7. Steam and Gas Tubes and Fittings.
8. Gas-Meters.
9. Paints.
10. Chandlery.
11. Oils, Tallow, &c.
12. Cotton Waste.
13. India-rubber Rings, Sheeting, &c.
14. Cement and Lias Lime.
15. Timber.
16. Rope Yarn, &c.
17. Veterinary Attendance
18. Steel Shovels, &c.
19. Brushes and Besoms.
20. Cast-Iron Meter Cases
21. Phosphor Bronze and Gun Metal Fittings for Meters.

Forms of Tender and all Information may be obtained, and Samples seen, on application to the Gas Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Stores," addressed to the Chairman of the Gas Committee, must be delivered to me not later than Five p.m., on Thursday, the 5th of July.

By order,
SAMUEL BROWN,
Town Clerk.

Town Hall, Salford,
June 15, 1894.

TENDERS FOR GAS COAL.

THE Corporation of Droitwich invite TENDERS for the supply of from 700 to 900 tons of best screened GAS COAL, to be delivered free at Droitwich (G.W.) Railway Station, at such times and in such quantities as may be required, prior to the 31st of May, 1895.

Particulars and Form of Tender may be obtained on application to the Manager of the Gas-Works.

Sealed tenders, on the form provided for the purpose (with the Analysis of the Coal to be supplied), endorsed "Tender for Gas Coal," to be sent to the undersigned on or before the 23rd inst.

The Corporation do not bind themselves to accept the lowest or any tender.

S. JOHN TOMBS,
Town Clerk.

Droitwich, June 4, 1894.

CITY OF HEREFORD.

THE Gas Management Committee of the Corporation invite TENDERS for the supply of best screened large GAS COAL for One Year, from the 1st of August next, to be delivered free at the Gas-Works Siding, Hereford, in such quantities as may be required from time to time.

The estimated quantity required will be about 8000 tons.

Full Particulars and printed Forms of Tender may be obtained on application to the undersigned.

Tenders, endorsed "Tender for Gas Coal," are to be sent in, addressed to the Chairman, Gas Management Committee, Mansion House, Hereford, by Saturday, July 7.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
WILLIAM PARLBY,
Gas Engineer and Manager.

Gas-Works, Hereford,
June 13, 1894.

TIPTON GAS-WORKS.

TAR CONTRACT.

THE Gas Committee of the Tipton Local Board invite TENDERS for the purchase of the surplus TAR produced at the above Works, during a period of One, Two, or Three Years from the 1st of July next.

Particulars may be obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer and Manager.

The Tar may be delivered either into Boats or on Rail (L. & N.W.R.), as may be required.

Sealed and endorsed tenders to be sent to me the undersigned, not later than Ten a.m., on Saturday, the 23rd inst.

The Committee do not bind themselves to accept the highest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Public Offices, Tipton,
June 5, 1894.

TIPTON GAS-WORKS.

COAL CONTRACTS.

THE Gas Committee of the Tipton Local Board are prepared to receive TENDERS for the supply of GAS COAL for a period of One, Two, or Three Years, from the 1st of July next, in annual quantities of about 10,000 tons, to be delivered, carriage free, to the Gas-Works Siding (L. & N.W.R.).

Specification and Form of Tender may be obtained at the Gas-Works, on application to Mr. Vincent Hughes, the Engineer and Manager.

Sealed and endorsed tenders to be sent to me the undersigned, not later than Ten a.m. on Saturday, the 23rd inst.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
GEO. M. WARING,
Clerk to the Board.

Public Offices, Tipton,
June 5, 1894.

VESTRY OF PADDINGTON.

(PUBLIC LIGHTING DEPARTMENT.)

TO GAS-METER MANUFACTURERS AND OTHERS.

THE Vestry of the Parish of Paddington are prepared to receive TENDERS for the following Works, viz.—

The REPAIR AND ADJUSTMENT from time to time of certain WET LAMP METERS and CAST-IRON METER-BOXES (about 100 in number); also the REPAIRING, ADJUSTING, AND TESTING, from time to time, of certain COCKS, GOVERNORS, AND BURNERS (about 1980 in number).

The Contract to be for One, Three, or Five Years.

Printed Forms of Tender may be had at the Vestry Hall, and further Particulars obtained on application to the Surveyor between the hours of Ten a.m. and Four p.m.; Saturdays, Ten a.m. to One p.m.

No tender will be accepted unless made on one of the printed forms.

The tenders to be sealed and delivered at the Vestry Hall, Harrow Road, before Three o'clock p.m., on Monday, the 2nd day of July, 1894, after which no tender will be received.

At the same time, a £10 Bank of England note (not to be enclosed with the tender) must be lodged with the Vestry Clerk as evidence that the tender is made *bonâ fide*; the same to be returned immediately to Parties whose tenders are rejected, but in the case of the party whose tender is accepted, to be retained until the Contract is signed.

If the tender be withdrawn after its acceptance by the Vestry, the Deposit will become forfeited.

The Vestry do not bind themselves to accept the lowest or any tender.

By order,
FRANK DETHRIDGE,
Vestry Clerk.

Vestry Hall, Harrow Road,
London, W., June 13, 1894.

HAYWARDS HEATH GAS COMPANY, LTD.

GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 1500 tons of GAS COAL, to be delivered in such quantities and at such periods as may be ordered, until the 30th of June, 1895.

The Coal required is to be unscreened, and to be delivered, in Trucks, free at the Haywards Heath Railway Station, L.B. & S.C.R., either from the South Yorkshire or Durham Coal-Fields.

Payments: Net Cash, Monthly.

Tenders are to state the name of the Pits from which the above description of Coal will be supplied; the same to be Fresh Wrought, and free from Slate, and to the entire satisfaction of the Company's Manager.

The Board have no special Form of Tender, and do not bind themselves to accept the lowest or any tender.

Tenders are to be received by me on or before the 23rd day of June next, and endorsed "Tender for Gas Coal."

(Signed) ARTHUR H. CÆSAR,
Secretary.

85, Gresham Street, London, E.C.

CONTRACT FOR GAS COAL.

NOTICE is Hereby Given, that the Local Board for the District of the Town of Horncastle, in the County of Lincoln, are prepared to receive TENDERS for the supply of from 500 to 1500 tons (Railway Weight) of best screened SILKSTONE GAS COAL and GAS NUTS, to be delivered by the 30th of June, 1895, in such quantities and at such times as the Board may direct.

The Coal to be sent in a dry condition, free from Hards, Smudge, Dirt, Shale, Pyrites, or other Impurities.

Sealed tenders, marked "Tender for Gas Coal," to be sent to the Chairman of the Board, Mr. John Panton, High Street, Horncastle, on or before the 27th day of June, 1894.

The Board do not bind themselves to accept the lowest or any tender.

By order,
CHARLES DEE,
Clerk to the Board.

Horncastle, June 9, 1894.

TAR AND AMMONIACAL LIQUOR.

THE Horncastle Local Board are pre- pared to receive TENDERS for the purchase of surplus TAR and AMMONIACAL LIQUOR, which will be produced at their Gas-Works, for One Year from the 30th of June, 1894.

About 1800 tons of Coal will be carbonized during the year.

The strength of the Liquor, to be tested by Twaddell's Hydrometer (temperature 60°); and the tender to state the price per ton of 4°, rising ½° up to 8°.

The Tar and Liquor will be delivered at the Great Northern Railway Station at Horncastle in the Contractor's Tanks.

Sealed tenders, marked on the cover "Tender for Tar, &c.," to be sent to the Chairman of the Board, Mr. John Panton, High Street, Horncastle, on or before the 27th day of June, 1894.

The Board do not bind themselves to accept the highest or any tender.

By order,
CHARLES DEE,
Clerk to the Board.

Horncastle, June 9, 1894.

LURGAN GASLIGHT & CHEMICAL COMPANY, LIMITED.

COAL WANTED.

THE Directors invite Tenders for the supply of 2500 tons of best (screened) GAS COAL delivered into Lighters *ex*-ship at Belfast, free of all charges.

Delivery of 2000 tons will be taken before the 1st of November next; the remainder to be delivered at such times, before the 1st of April, 1895, as may be required.

Vessels carrying from 200 to 300 tons can at once deliver into Lighters; and these Lighters be back for a further cargo within a period to be arranged and agreed upon by the Gas Company.

Tenders (in sealed envelope), accompanied by reference to Gas-Works using the Coal offered, should reach me not later than Ten o'clock in the Forenoon of Monday, the 2nd of July, 1894.

The Directors do not bind themselves to accept the lowest or any tender.

FRED. W. MAGAHAN,
Secretary.

Gas-Works, Lurgan,
June 14, 1894.

KNARESBOROUGH LOCAL BOARD.

THE Gas Committee of the above Board invite TENDERS for the purchase of the surplus TAR and LIQUOR produced at their Works, the same to be delivered in Buyer's Tanks at the Railway Station, Knaresborough.

Price per ton for Tar (separate). Price per ton for Liquor per degree Twaddel, from 5° upwards.

Coal Carbonized, about 2000 tons per annum.

The Committee also invite TENDERS for the supply of from 50 to 100 tons of good LIME, free from Dirt and Ashes, delivered fresh at Knaresborough Station.

Also for the supply of the under-mentioned Sundries—

RED OXIDE PAINT, RED AND WHITE LEAD, OILS,
BRUSHES, SPUN YARN,
WROUGHT-IRON PIPES, AND TUBING (STEAM),
SHOVELS, FORKS, TOOLS, AND LEAD PIPE.

Tenders, endorsed under the different headings, "Tar and Liquor," "Lime," "Paints and Oils," and "Sundries," to be sent to the Chairman of the Gas Committee not later than Wednesday, the 27th of June, 1894.

The Committee do not bind themselves to accept the lowest or any tender.

No Forms of Tender.

T. SETTLE.

Gas-Works, Knaresborough,
June 7, 1894.

CRYSTAL PALACE DISTRICT GAS COMPANY.

THE Directors of the above Company have determined to REDUCE the PRICE of GAS to Two Shillings and Eightpence (2s. 8d.) per 1000 cubic feet, from and after the date of the present Midsummer Quarter's Accounts.

By order of the Board,
CHARLES M. OHREN,
Secretary.

Offices and Works: Lower Sydenham, S.E.,
June 15, 1894.

COCKERMOUTH LOCAL BOARD.
(GAS DEPARTMENT.)

THE Gas Committee of the above Board invite TENDERS for the supply of GAS COAL, delivered at Cockermouth Station, during Twelve Months commencing the 1st of July next.

Particulars to be obtained from the undersigned.

Tenders, with description and analysis of Coals offered, to be sent in not later than June 25, addressed to the Chairman, Gas Committee, Cockermouth.

ER W. SMITH,
Gas Manager.

PENRITH LOCAL BOARD.

THE Gas Committee are prepared to receive TENDERS for ADDITIONS to RETORT-BENCH, comprising one through Arch for two Beds of seven Retorts, with all Ironwork to complete.

Plans and Specifications may be seen on application at the Works after Thursday, the 21st inst.

Endorsed tenders to be delivered to the Chairman of the Gas Committee by Wednesday, July 4.

E. SHAUL,
Manager.

Gas-Works, Penrith,
June 16, 1894.

TENDERS FOR GAS COAL.

THE Directors of the Cheltenham Gas-light and Coke Company are prepared to receive TENDERS for the supply of GAS COAL for One Year from the 1st day of September next.

Particulars may be obtained from the undersigned, to whom the tenders must be delivered on or before Thursday, the 21st inst.

The Directors do not bind themselves to accept the lowest or any tender.

R. O. PATERSON,
Engineer.

Gas-Works, Cheltenham,
June 8, 1894.

BOROUGH OF DARWEN.
(GAS DEPARTMENT.)

TO COLLIERY PROPRIETORS.

THE Gas Committee of the above Cor-poration are prepared to receive TENDERS for 11,000 tons of GAS COAL, and 3000 tons of CANNEL.

Particulars and Forms of Tender may be obtained from Mr. Thos. Duxbury, Gas Engineer, Gas-Works, Darwen.

Sealed tenders, endorsed, to be delivered to me on or before Saturday, June 23 inst.

By order,
CHAS. COSTEKER,
Town Clerk.

LONGWOOD GAS COMPANY.

TAR AND LIQUOR.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Year commencing July 1, 1894.

The Liquor to be 5° Twaddel.

The estimated quantity for disposal is about 950 tons.

Sealed tenders, endorsed "Tar and Liquor," addressed to the Chairman, Gas Offices, Longwood, Huddersfield, to be sent in not later than Wednesday, June 20, 1894.

JOHN LOWE MITTON,
Manager and Secretary.

PONTYPRIDD LOCAL BOARD (GAS).

TENDERS FOR MAINS AND SPECIALS.

THE Gas Committee invite Tenders for the supply of 3-inch, 4-inch, 6-inch, 10-inch, 12-inch, and 18-inch MAINS and SPECIALS.

Specification and Form of Tender may be obtained on application to Mr. H. Barker, Manager, Gas-Works, Pontypridd.

Tenders, sealed and endorsed "Tender for Pipes," to be sent to the undersigned not later than Tuesday, the 26th of June, 1894.

The Committee do not bind themselves to accept the lowest or any tender.

HENRY LL. GROVER,
Clerk to the Board.

Pontypridd, June 6, 1894.

COUNTY BOROUGH OF BURY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Bury are prepared to receive TENDERS for the supply of GAS COAL and CANNEL for a period of Nine Months, commencing on the 1st day of October, 1894, to be delivered free at the Corporation Siding, Bury, in equal monthly quantities.

Estimated quantities about 16,000 tons of Coal, and 1500 tons of Cannel.

Full Particulars and Form of Tender may be obtained on application to Mr. W. H. S. Gendall, Engineer and Manager, Gas-Works, Elton, Bury.

Sealed tenders, endorsed "Tender for Coal and Cannel," to be sent to me, the undersigned, on or before June 23, 1894.

The Corporation do not bind themselves to accept the lowest or any tender.

JOHN HASLAM,
Town Clerk.

Corporation Offices, Bury,
June 1, 1894.

MORECAMBE GAS AND LIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 3000 tons per annum of screened GAS COAL, to be delivered on the Gas-Works Siding, Midland Railway, Morecambe, in such quantities as may be required during a period of One, Two, or Three Years.

Tenders, specifying the description of Coal, the name of the pit at which it is raised, and the terms for net monthly payments, are to be sent in on or before Tuesday, the 26th of June, 1894, endorsed "Tender for Coal."

WILLIAM DUFF,
Secretary and Manager.

Market Street, Morecambe,
June 11, 1894.

EASTBOURNE GAS COMPANY.

TENDERS FOR COALS.

THE Directors of the Eastbourne Gas Company invite TENDERS for the supply of 20,000 tons of best unscreened GAS COALS for One, Two, or Three Years respectively, at the option of the Company (to be declared when the tender is accepted), from the 1st day of September next; the Coals to be delivered at the Eastbourne Railway Station, in quantities of 2000 tons per month, until the 20,000 tons have been delivered.

Further Particulars may be obtained from, and sealed tenders, endorsed "Tenders for Coal," must be sent in not later than the 29th day of June, 1894, to the undersigned.

J. H. CAMPION COLES,
Secretary.

FARNWORTH AND KEARSLEY GAS COMPANY.

TENDERS FOR TAR AND AMMONIACAL LIQUOR.

THE Directors of the Farnworth and Kearsley Gas Company are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR, to be produced at their Works for One or Two Years from the 1st day of July next.

Sealed tenders, addressed to Thomas Morris, Esq., Chairman, to be delivered at the Gas Offices on or before Monday, the 25th of June next.

Further Particulars may be obtained from the undersigned.

THOMAS LEA SHEPPARD,
Manager.

Gas Offices, Cross Street, Farnworth,
June 8, 1894.

NEWARK GAS COMPANY.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Newark Gas Com-pany are prepared to receive TENDERS for the purchase of the surplus TAR, produced at their Works, free on rail G.N.R. or M.R., in Purchaser's Tanks, for One Year from the 1st day of July, 1894.

Terms: Cash Monthly.

Further Particulars can be obtained on application to the undersigned, to whom sealed tenders are to be sent on or before the 18th inst., marked on the outside "Tender for Tar."

The Directors do not bind themselves to accept the highest or any tender.

By order,
F. B. FOOTTIT,
Secretary.

Newark, June 4, 1894.

COUNTY BOROUGH OF WEST BROMWICH.
(GAS DEPARTMENT.)

TO COLLIERY PROPRIETORS.

THE Gas Committee are prepared to receive TENDERS for the supply of 22,000 tons of best screened GAS COAL, for use at their Works, Albion, West Bromwich.

The Committee do not bind themselves to accept the lowest or any tender; and they reserve to themselves the right to divide the contract between several Firms.

Forms of Tender may be obtained upon application to Mr. Littlewood, Manager of the Works.

Sealed tenders, properly endorsed, to be delivered to me not later than Twelve o'clock Noon, on Friday, June 22.

By order,
THOS. HUDSON,
Secretary.

Town Hall, West Bromwich,
June 5, 1894.

TO GASHOLDER MAKERS.

THE Gas Committee of the Todmorden Local Board are prepared to receive TENDERS and DESIGNS for the construction and erection of a WROUGHT-IRON TANK and TELESCOPIC GAS-HOLDER; the Tank to be 134 ft. 6 in. diameter and 25 ft. deep. The Gasholder to be two Lifts, prepared for a third.

Full Particulars may be had, and the Site inspected, from the 11th to the 18th of June, on application to the undersigned.

Sealed tenders, endorsed "Tender for Gasholder and Tank," to be sent in not later than Six p.m., on Tuesday, the 26th inst., addressed to the Chairman of the Gas Committee, Town Hall, Todmorden.

By order,
GEORGE E. SAVILLE,
Engineer and Manager.

Gas-Works, Todmorden,
June 7, 1894.

N.B.—No allowance for tender, nor pledge to accept the lowest or any tender.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS, so far as they relate to DEBENTURE STOCK only, WILL BE CLOSED on the 23rd of June inst., and re-opened on the 2nd of July, 1894.

S. J. WILLIAMS,
Secretary.

63, Chancery Lane, W.C.

TENDERS FOR GAS COAL.

THE Directors of the Banbury Gas Com-pany are prepared to receive TENDERS for GAS COALS (in lots of 1000 tons and upwards), to be delivered by Rail on the Company's Sidings at Banbury, in equal monthly quantities, from July 1, 1894, to June 1, 1895.

The Coal to be clean, dry, and fresh worked.

Short weight or inferior quality to be allowed for.

Sealed tenders, endorsed "Tender for Coal," specifying the description and quality of the Coal, to be delivered, at the Office of the Company at Banbury, not later than Saturday, the 23rd day of June.

The Directors reserve to themselves the right to accept the whole or any portion of any quantity offered, and do not bind themselves to accept the lowest or any tender.

W. R. COOPER,
Secretary.

Gas Office, Gas-Works, Banbury,
June 12, 1894.

SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gas-light Company invite TENDERS for the supply of about 12,000 tons of screened GAS COALS, and about 1000 tons of good ENGLISH CANNEL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the Year commencing July 1, 1894, and ending June 30, 1895.

The Directors reserve to themselves the right to divide the quantity into two or more Contracts, and do not bind themselves to accept the lowest or any tender.

Tenders must be made on Forms (containing further particulars), which may be obtained on application at the Company's Works, or by post, and must be sent to the undersigned, on or before the 22nd day of June, 1894.

By order,
WM. BELTON, Assoc.M.Inst.C.E.,
Secretary and Manager.

Gas-Works, Shrewsbury,
May 22, 1894.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the TRANSFER BOOKS of the Company, so far as the DEBENTURE STOCK only is concerned, WILL BE CLOSED on and from the 25th of June, 1894, until the 3rd of July, 1894, both days inclusive.

By order,
WALTER CROMARTY,
Secretary.

Offices: North Street, Wandsworth,
June 13, 1894.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cubic feet.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

COKE BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

For Exhauster Advertisement, see last week.

GEORGE WALLER & CO.,
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And at STROUD, GLOUCESTERSHIRE.

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The following is a complete ultimate Analysis of the Coal.

	Per Cent.
Carbon	83·128
Hydrogen	5·116
Oxygen	7·401
Nitrogen	0·585
Sulphur	0·620
Ash	3·130
Water	0·020
	100·000

Analysis of the Coke.

Carbon	93·31
Sulphur	0·61
Ash	5·00
Moisture	1·08
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Yours truly,

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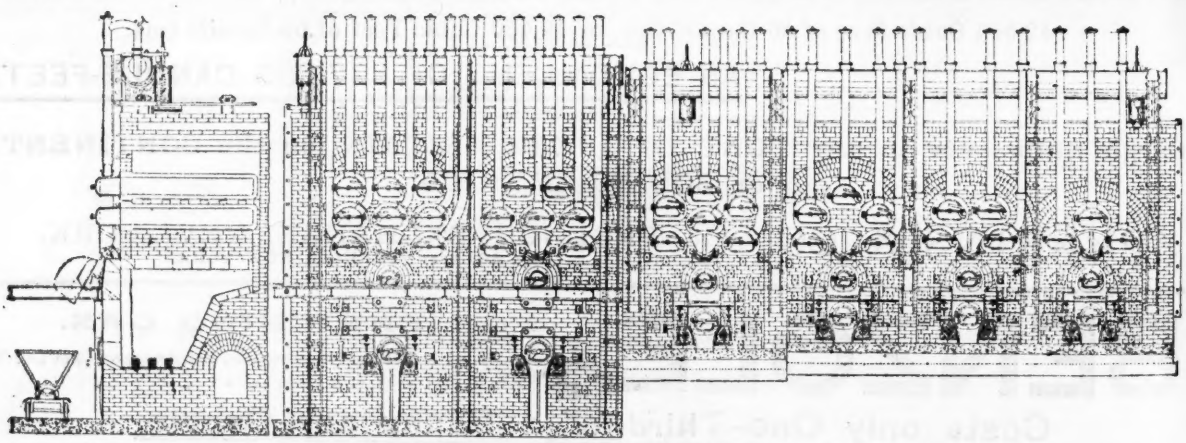

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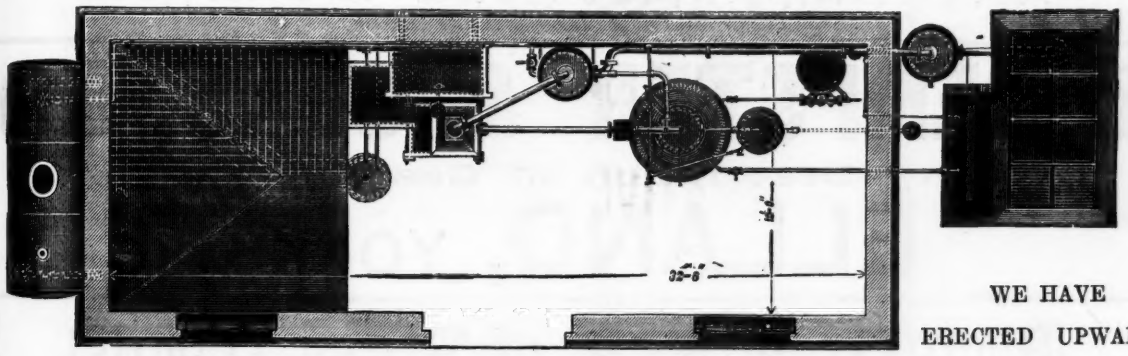

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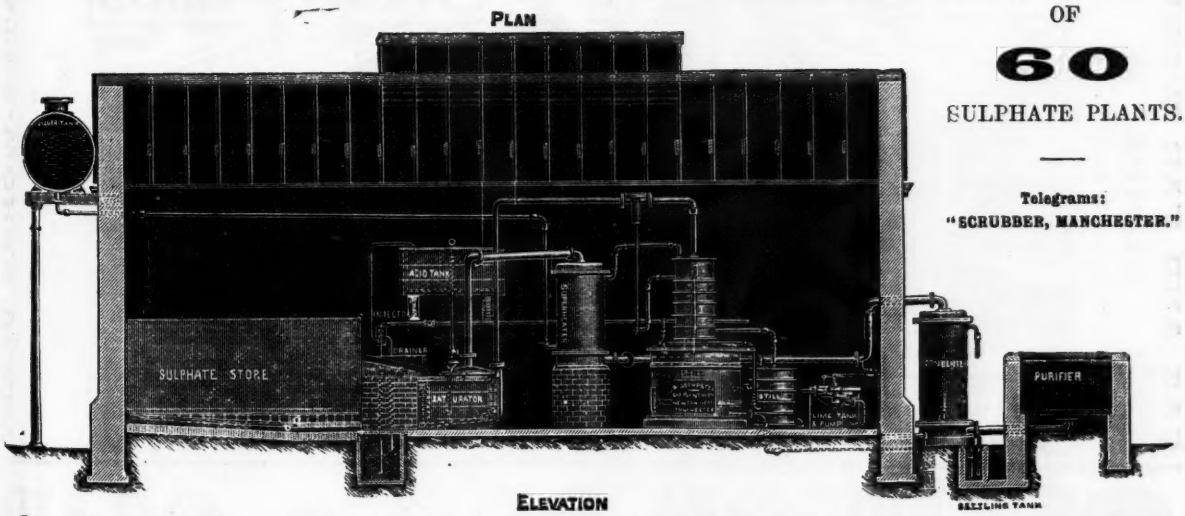

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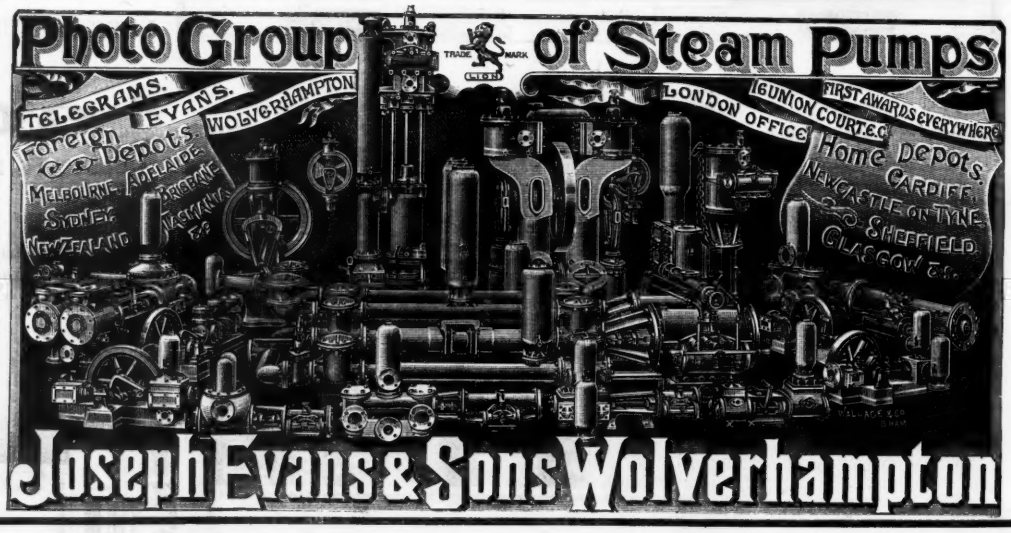

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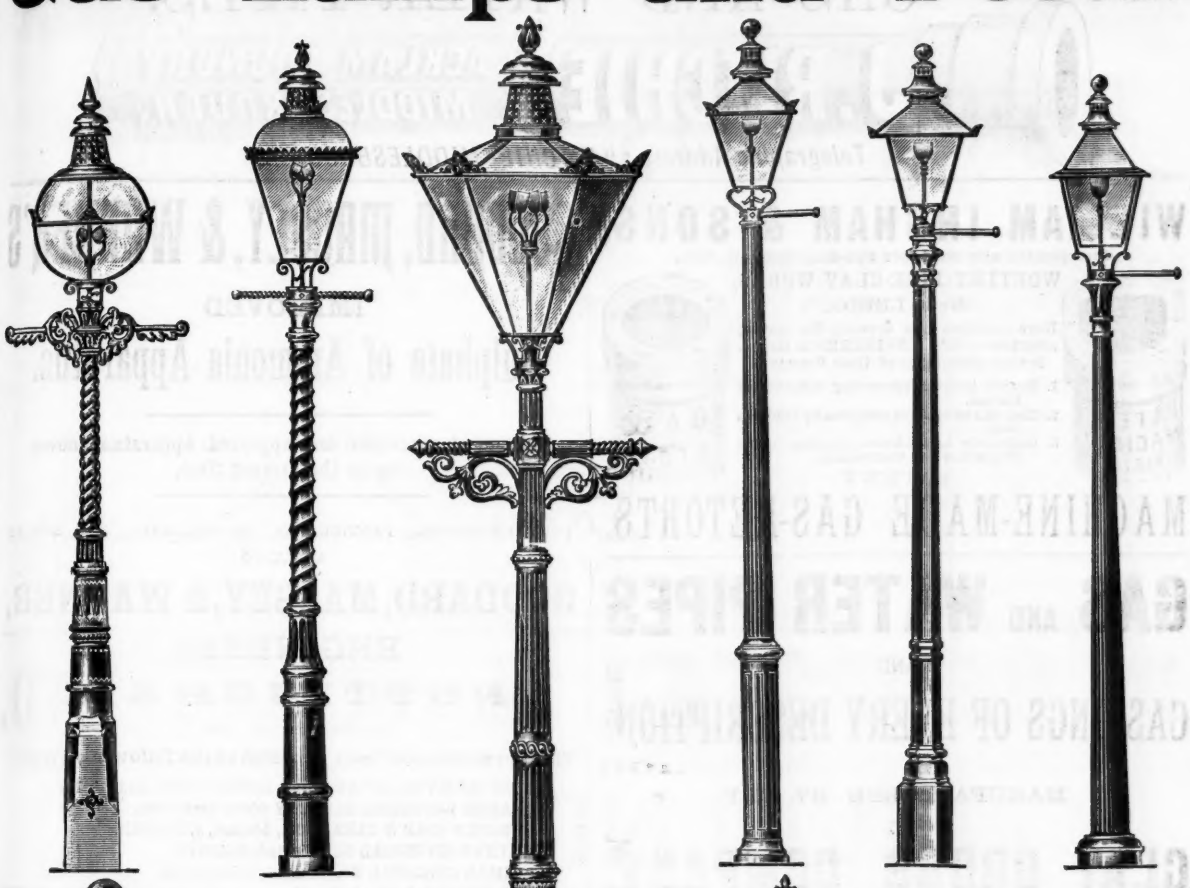

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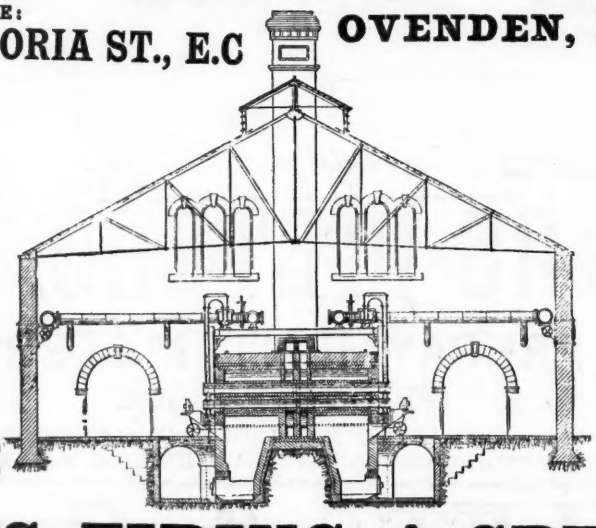

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See Illustrated Advertisement, p. II. Centre of JOURNAL for June 5.

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LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, June 19, 1894.